

CHAPTER 4

GRADUATE EDUCATION

Enrollment Overview

Graduate education in the United States sets a world standard; it is highly regarded not only by students in this country but also by persons from abroad. Graduate education constitutes a critical step in the preparation of most scholars and professionals. In pursuing graduate training, students must be more focused and directed in what courses they take.

Graduate school enrollment in the United States in science and engineering continued to increase over the 1985–1995 decade, from 358,126 students in 1985 to 423,922 students in 1995. (See appendix table 4-1.) In the most recent years (1993–1995), however, enrollment decreased by 3 percent. In addition, the composition of enrollment in graduate education in science and engineering fields became more diverse.

Women increased not only their numbers but also their share of total graduate enrollment, slowly becoming a majority in graduate enrollment in all fields combined (Syverson and Welch, 1996). Progress has been slower in science and engineering fields, where women and minorities (with the exception of Asian students) continue to be underrepresented in graduate school.¹ Women registered gains over the 1985–1995 decade in graduate enrollment, however, and underrepresented minorities made more limited progress.

Women

Enrollment Composition

Women's graduate enrollment in the science and engineering fields, at 160,864 students in 1995, has increased 45 percent from 1985 enrollment of 110,662. (See figure 4-1 and appendix table 4-2.) During the same period, the number of male science and engi-

neering graduate students reached 263,058, a 6 percent increase from 247,464 in 1985. (See appendix table 4-3.) Graduate enrollment steadily increased in almost all fields until 1993 when small changes within fields resulted in decreases. In some cases, this was the first time in 20 years that decreases had occurred. These changes had an effect on total graduate enrollment in 1995. (See appendix table 4-1.) Although total enrollment decreased 3 percent and male enrollment decreased 6 percent between 1993 and 1995, the number of female students grew by 3 percent from 156,757 in 1993 to 160,864 in 1995. (See appendix table 4-2.) Most of the increase in the number of women graduate students can be attributed to increased enrollment in the social sciences, (to 42,274), psychology (to 38,142), and the biological sciences (to 28,819) in 1995. Not surprisingly, biological sciences, psychology, and social sciences command the largest proportions of women science students: 20 percent, 27 percent, and 30 percent, respectively, and the largest numbers of female graduate students. (See figures 4-2 and 4-3.)

Changes in Enrollment

Female graduate science enrollment rose by 43 percent from 99,582 in 1985 to 142,712 in 1995. The increase has slowed recently, however; an increase of only 3 percent occurred from 1993 to 1995. As a proportion of total female science and engineering graduate enrollment, women enrolling in engineering increased from 10 to 11 percent. (See appendix table 4-2.) Female enrollment in the physical sciences increased 40 percent between 1985 and 1995, although it has decreased 1 percent since 1993. Other major science fields in which female enrollment decreased from 1993 to 1995 were mathematics (6 percent) and computer science (4 percent). (See appendix table 4-2.)

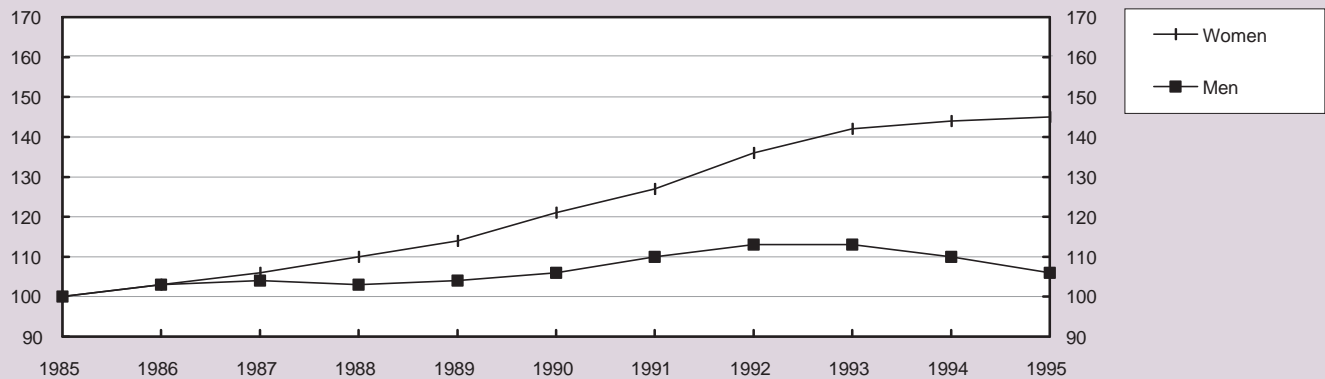
Female enrollment in earth, atmospheric, and ocean sciences increased by 40 percent between 1985 and 1995. As noted previously, most female graduate enrollment is concentrated in the biological sciences, psychology, and social sciences, and all had increases

¹ It must be noted that over the last decade women and minorities have made progress in the proportion of their participation in science and engineering fields. Because of the nature of calculating percentage changes, in many instances the largest increases are often within the populations that had the lowest numbers at the outset. Therefore, the reader is cautioned that the percentage change data for certain minority groups, although impressive, may not reflect very large increases in absolute numbers.

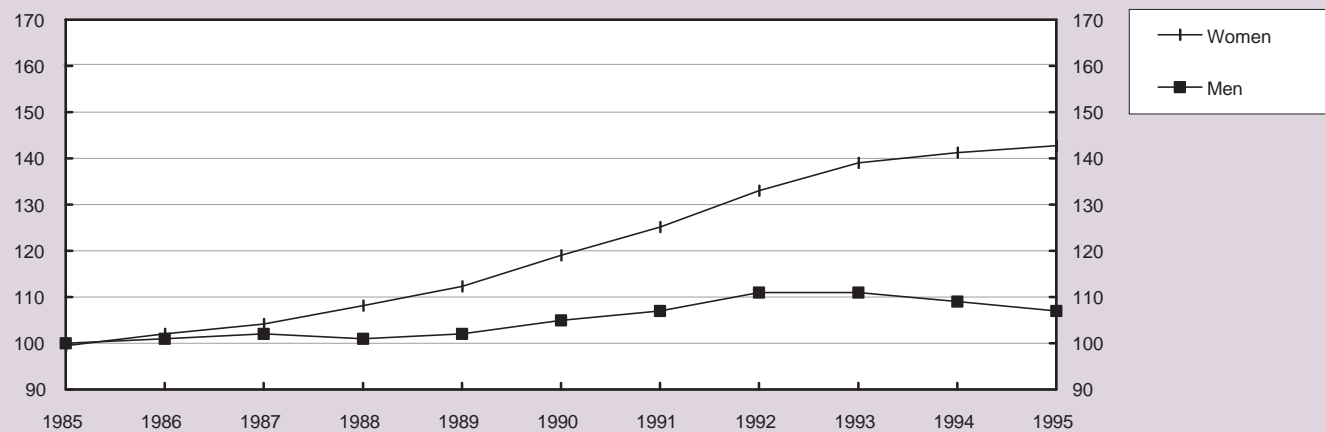
Figure 4-1.

Graduate science and engineering enrollment growth rate by sex: 1985–1995

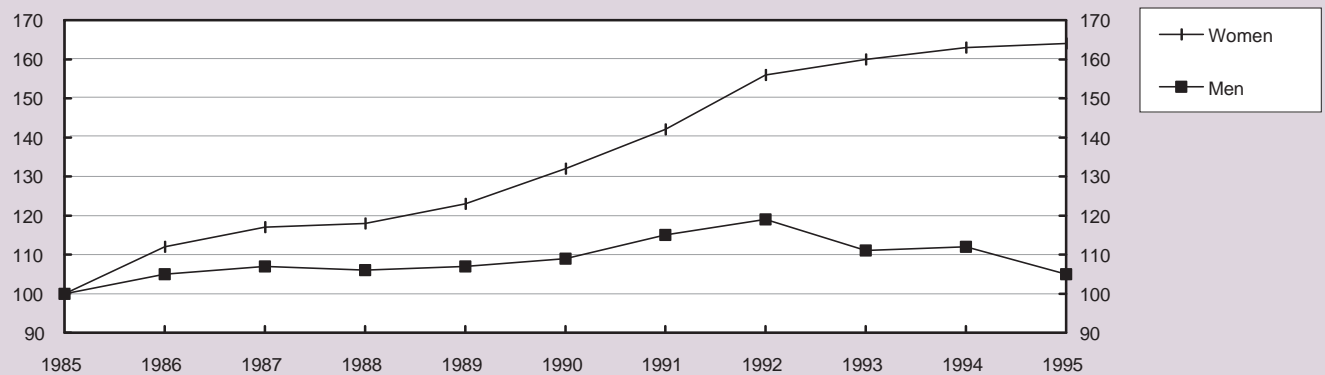
Index: 1985 = 100

**Graduate science enrollment growth rate by sex: 1985–1995**

Index: 1985 = 100

**Graduate engineering enrollment growth rate by sex: 1985–1995**

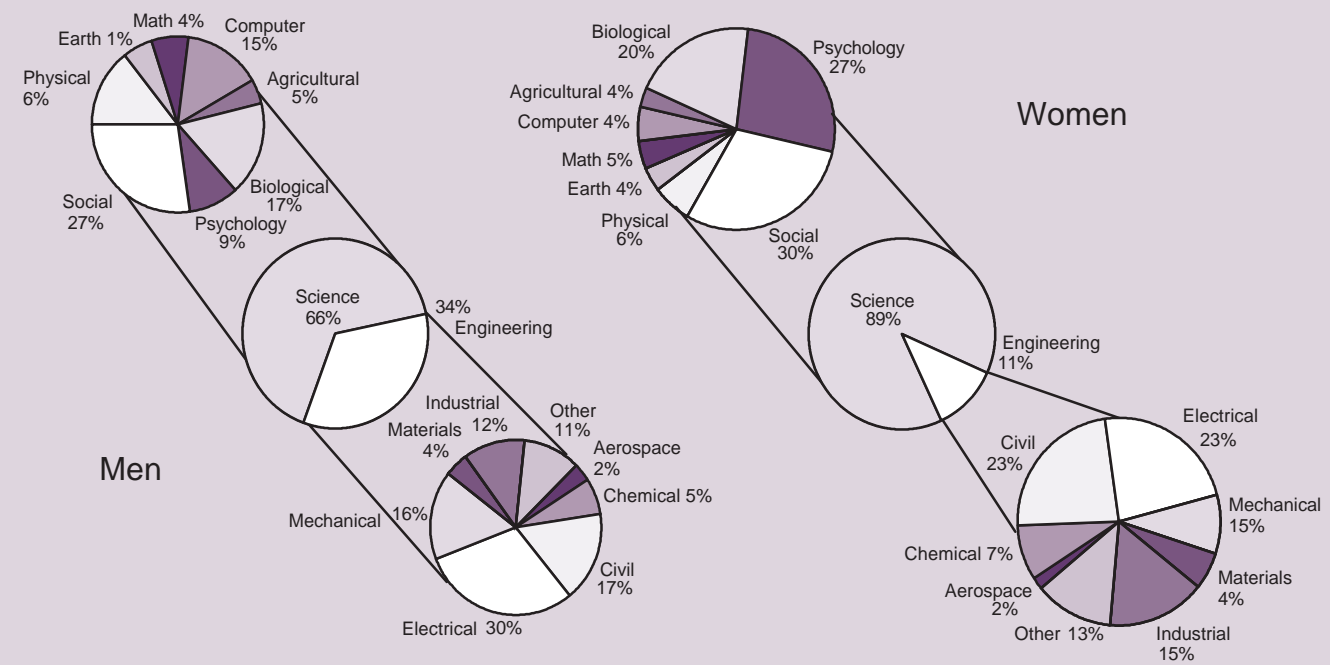
Index: 1985 = 100



See appendix tables 4-2 and 4-3.

Women, Minorities, and Persons With Disabilities in Science and Engineering: 1998

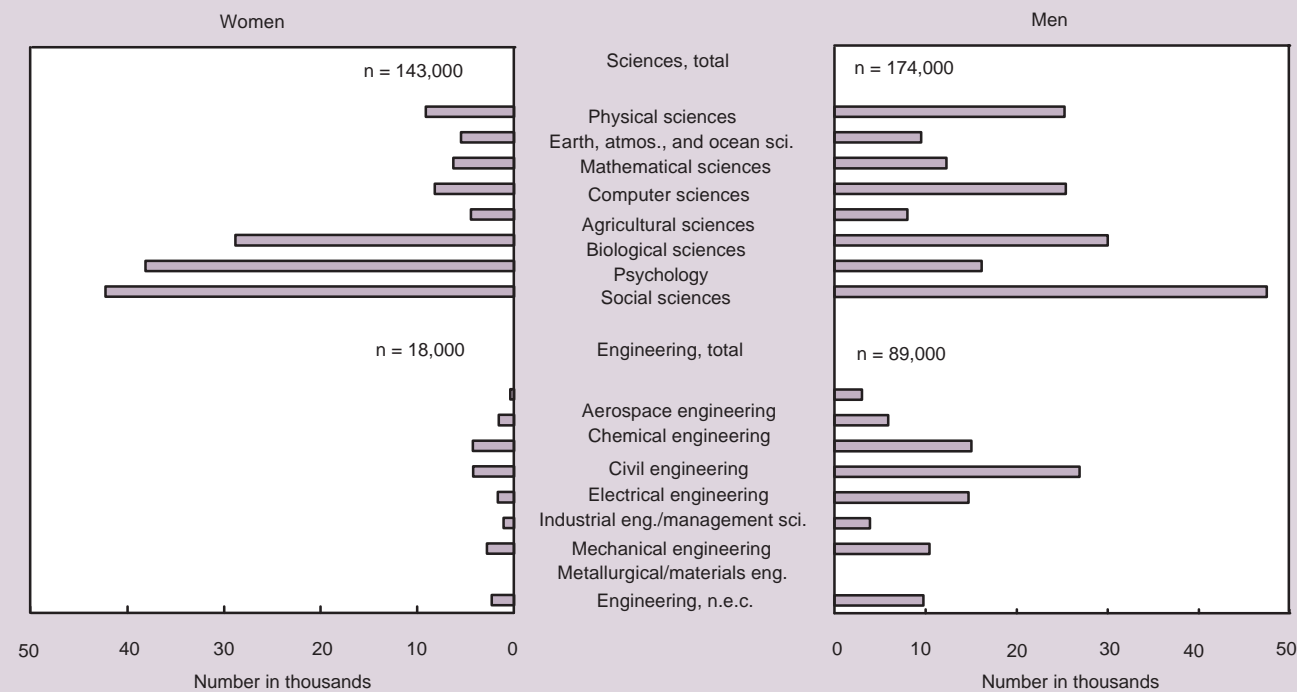
Figure 4-2.
Science and engineering graduate students, by field of enrollment: 1995



See appendix tables 4-2 and 4-3.

Women, Minorities, and Persons With Disabilities in Science and Engineering: 1998

Figure 4-3.
Science and engineering enrollment, by field and gender: 1995



See appendix tables 4-2 and 4-3.

Women, Minorities, and Persons With Disabilities in Science and Engineering: 1998

of approximately 50 percent between 1985 and 1995. (See appendix table 4-2.) Female enrollment in engineering fields increased 64 percent between 1985 and 1995, with the increase slowing to 3 percent between 1993 and 1995. Three of the eight engineering fields had decreases in the number of women graduate students between these 2 years: aerospace (2 percent), electrical (3 percent), and mechanical (6 percent). Engineering comprises 11 percent of female science and engineering enrollment; civil engineering and electrical engineering both comprise less than 3 percent. Astronomy, other geosciences,² and aerospace engineering had the largest increases in the number of women graduate students from 1985 to 1995 (107, 172, and 115 percent, respectively), although their share of total science and engineering remains very small. (See appendix table 4-2.)

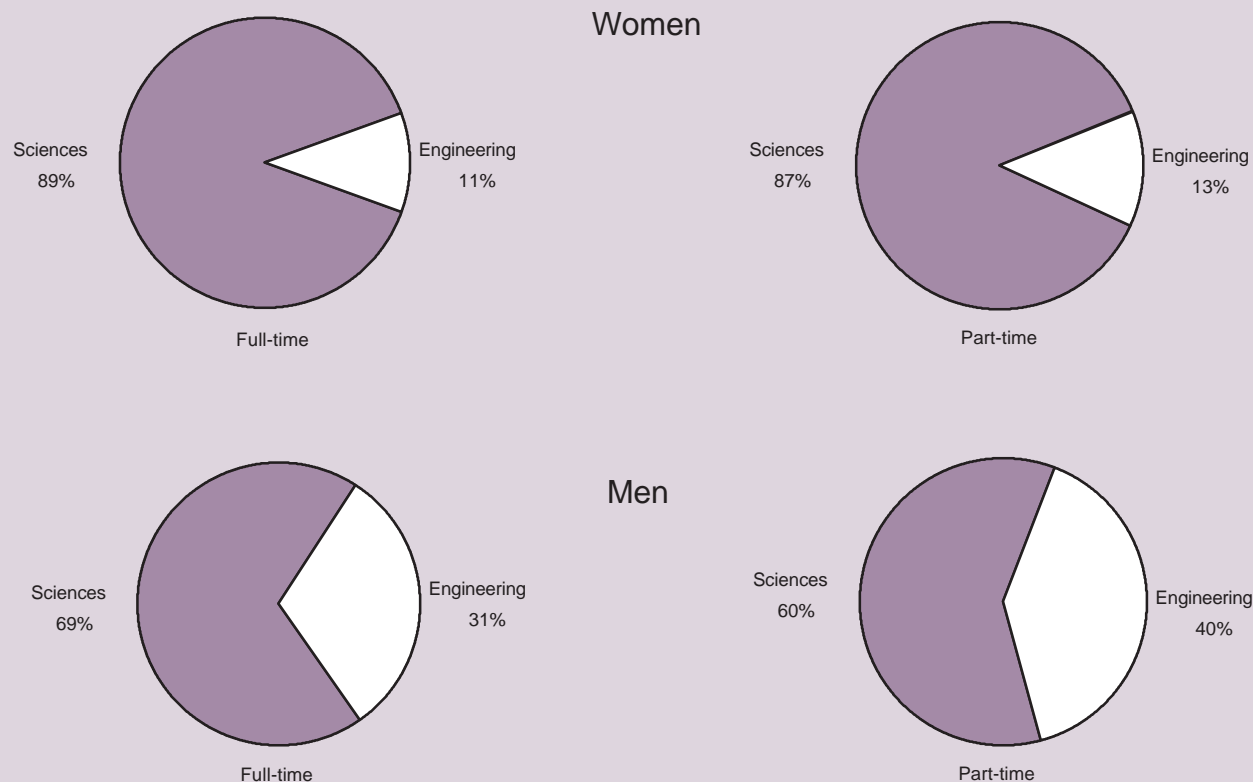
² "Other geosciences" includes such fields as conservation, environmental chemistry, environmental science, environmental science/planning, environmental studies, and natural resources.

Enrollment Status

An increasing percentage of the full-time graduate science and engineering student population are women. (See appendix tables 4-4 and 4-5.) Of the 107,805 women enrolled in science and engineering full time, 89 percent were in science fields in 1995 compared to full-time male science enrollment of 69 percent. (See figure 4-4.) Full-time female enrollment in graduate science and engineering programs increased 54 percent from 1985, compared to a male enrollment increase of 10 percent. Since 1993, female enrollment increased 4 percent when male enrollment decreased 6 percent. (See appendix tables 4-5 and 4-6.) Male enrollment continues to dominate the engineering fields, though there has been a 10 percent decrease in full-time male enrollment since 1993. (See appendix table 4-6.) Women, on the other hand, slightly increased their full-time engineering enrollment by 3 percent from 1993 to 1995. Women made long strides overall from 1985 to 1995 with an 84 percent increase

Figure 4-4.

Science and engineering graduate students by enrollment status and gender: 1995



See appendix tables 4-5, 4-6, 4-8, and 4-9.

in full-time engineering enrollment compared to men's 14 percent increase during the same period. Male enrollment in full-time science and engineering programs decreased in every field except biological sciences since 1993.

Female part-time graduate student enrollment in science was 87 percent of all female part-time science and engineering enrollment compared to men's 60 percent in 1995. (See figure 4-4.) Unlike the increase in female full-time enrollment, the part-time graduate enrollment in science and engineering for women of 53,059 in 1995 (39 percent of all part-time science and engineering graduate students) represented a 1 percent decline from the 1993 enrollment of 53,502. (See appendix table 4-7 and 4-8.) In comparison, however, enrollment for men also declined between 1993 and 1995: the 1995 enrollment of 82,847 was smaller than the 1993 enrollment of 88,504 by 6 percent. (See appendix table 4-9.) Female part-time enrollment decreased in the sciences but increased in engineering from 1993 to 1995 by 2 percent. Part-time female graduate enrollment increased 30 percent between 1985 and 1995. (See appendix table 4-8.) Male part-time graduate enrollment decreased 1 percent during that same period. (See appendix table 4-9.)

Sources of Financial Support

In 1995, both men and women in graduate engineering programs reported comparable means of financial support. The proportions relying primarily on self support were nearly the same, 27 percent for men and 29 percent for women. (See figure 4-5.) Only in the aerospace engineering field was there a notable gender difference in the proportions of students relying on self support, 20 percent for men and 13 percent for women. (See appendix table 4-10.)

In science, institutional support was the primary source of support for 45 percent of male and 43 percent of female graduate students. Female graduate students were more likely than males to be self supported (35 percent versus 26 percent). In computer sciences, psychology, and social sciences, close to 50 percent of women and about 40 percent of men relied on self support. In mathematics, almost equal proportions of men, 69 percent, and women, 67 percent, received institutional support.

Graduate Schools

The graduate school with the largest number of female graduate students in 1995 was the University of Minnesota (all campuses), which had 1,880 female graduates enrolled. (See figure 4-6.) This university has been the top graduate school in female enrollment

for 8 of the past 10 years. George Washington University increased its female enrollment over 100 percent, from 818 students in 1985 to 1,662 in 1995. Indiana University (all campuses) also increased its female enrollment by 100 percent, from 587 female students in 1985 to 1,423 female students in 1995. (See appendix table 4-11.)

In 1995, 4,489 science and engineering graduate students enrolled in Historically Black Colleges and Universities (HBCUs) of which 2,206 were women. Female graduate students increased their enrollment in HBCUs by 68 percent from 1985 to 1995. (See appendix tables 4-12 and 4-13.)

Minorities

Enrollment Composition

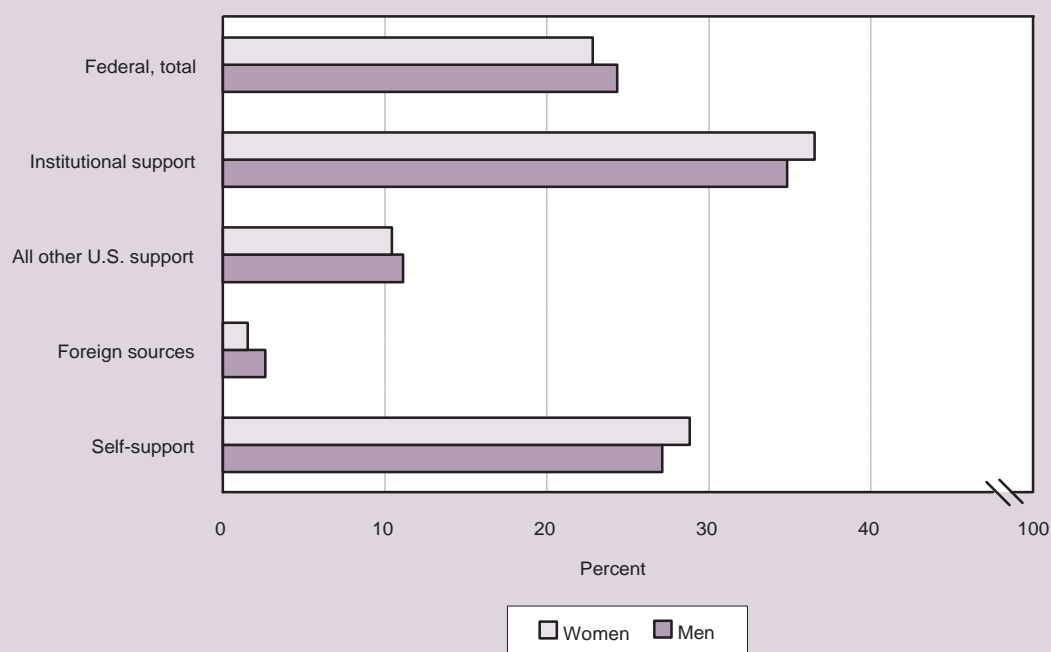
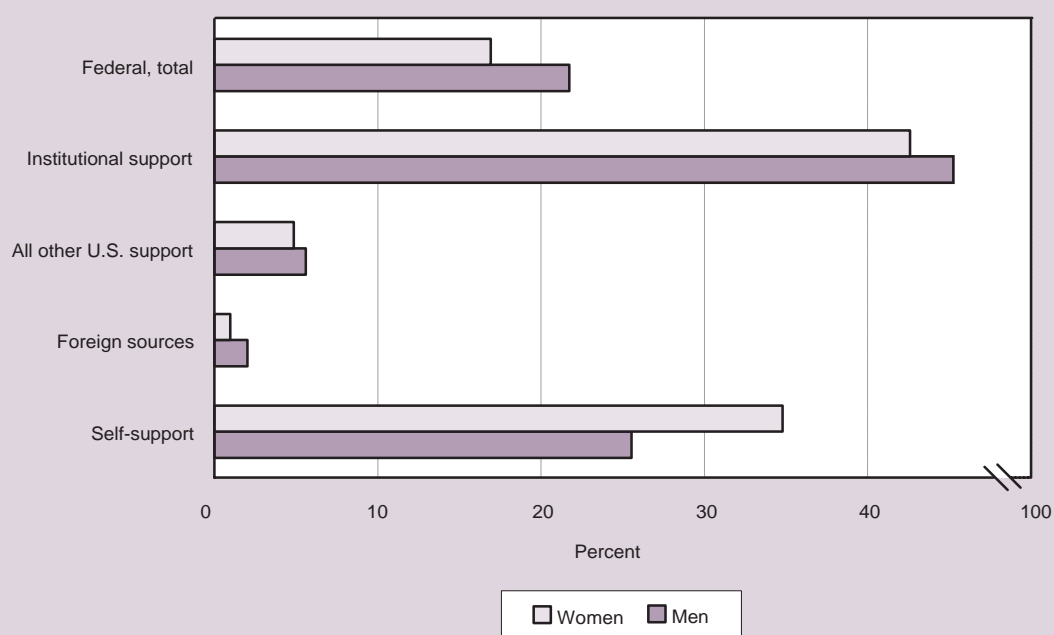
Of the 325,135 U.S. citizen and permanent resident students enrolled in graduate science and engineering programs in 1995 (both full time and part time) (see appendix table 4-14), 14 percent were minorities. Blacks (6 percent), American Indians (1 percent), and Hispanics (4 percent), continued to be substantially underrepresented. (See appendix tables 4-15, 4-16, and 4-17.) Asian students were 8 percent of graduate science and engineering enrollment. (See appendix table 4-18.)

Blacks

For black students, the increase in graduate science and engineering enrollment from 1985 to 1995 was 76 percent, an increase of approximately 8,000 students. In science, black enrollment was up 71 percent from 1985, from 9,066 students to 15,494 in 1995. (See figure 4-7.) Of the major fields, agricultural science, although numbers are small, increased its enrollment of black graduate students from 137 in 1985 to 293 students in 1995. Psychology and computer science fields almost doubled their enrollment of black graduate students during this period increasing 91 percent, adding 1,632 students into these fields. Over a third of black students were enrolled in social science. (See figure 4-8.) Of the 6,907 social science students enrolled in 1995, the largest field was political science with 3,559 students. Physics, atmospheric science, other geosciences, anthropology, and history of science, whose black enrollment more than doubled or tripled between 1985 and 1995, increased their black enrollment in these fields combined by 214 students. Engineering enrollment also doubled for blacks between 1985 and 1995, increasing 107 percent from 1,387 in 1985 to 2,872 in 1995, adding 1,485 students. Between 1993 and 1995, decreases

Figure 4-5.

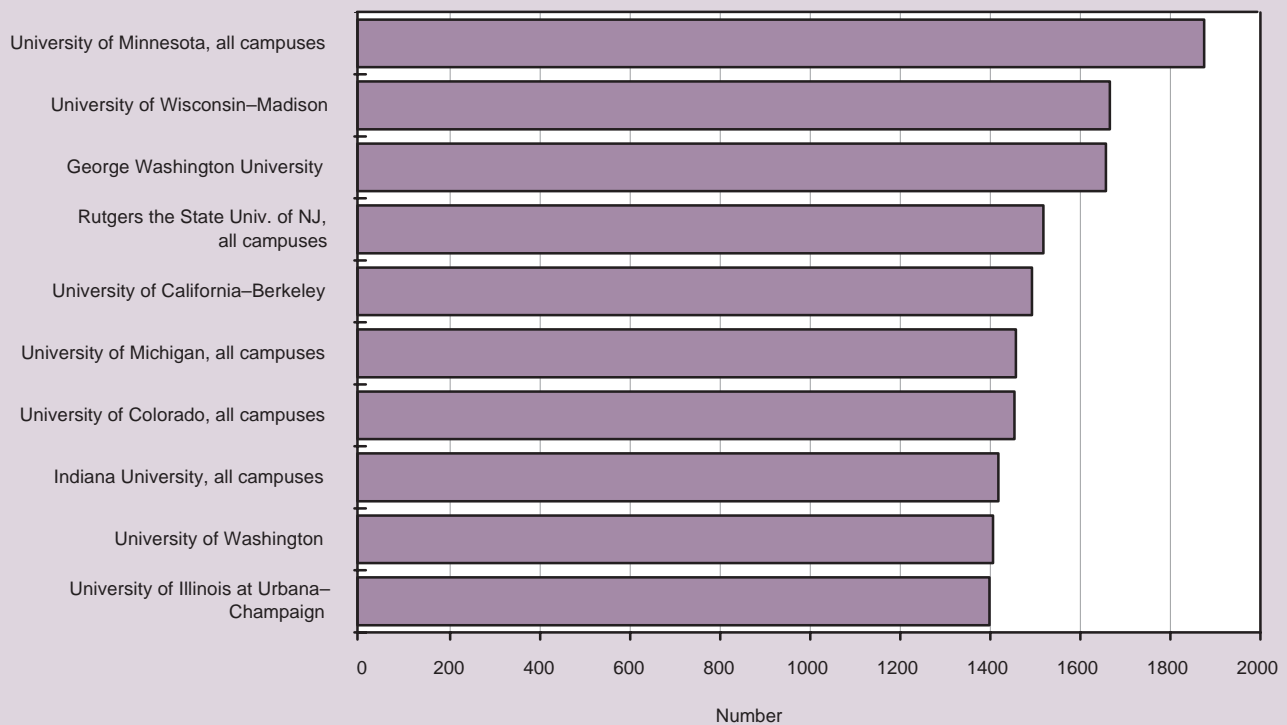
Primary source of support for full-time science and engineering graduate students in science, by sex: 1995



See appendix table 4-10.

Women, Minorities, and Persons With Disabilities in Science and Engineering: 1998

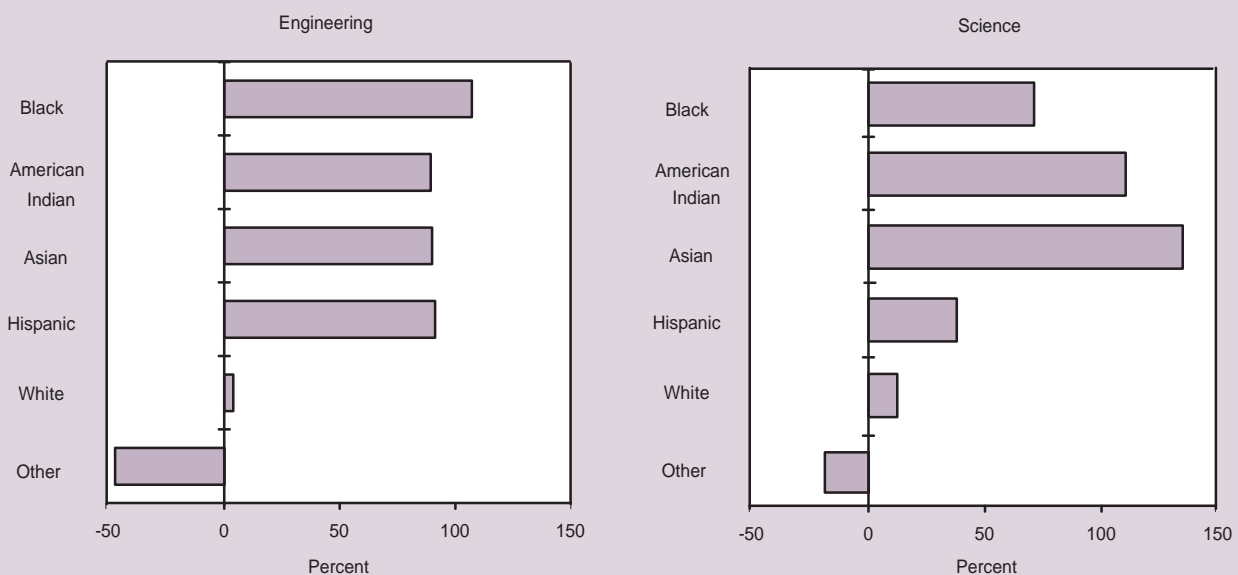
Figure 4-6.
Female graduate science and engineering enrollment, by institutional rank: 1995



See appendix table 4-11.

Women, Minorities, and Persons With Disabilities in Science and Engineering: 1998

Figure 4-7.
Percentage change in science and engineering enrollment, by field and race/ethnicity of U.S. citizens and permanent residents: 1985-1995



See appendix tables 4-15 and 4-20.

Women, Minorities, and Persons With Disabilities in Science and Engineering: 1998

in black student enrollment were small, losing fewer than 80 students in science subfields and fewer than 50 students in engineering subfields. (See appendix table 4-15.)

American Indians

There were 1,524 American Indians enrolled in science and engineering in 1995, an increase of 107 percent from 737 students enrolled in 1985.³ In science, enrollment increased 110 percent adding 688 students from 1985 to 1995. The fields with the largest concentrations of these graduate students were biological sciences (214 students), psychology (331 students), and social sciences (434 students). American Indian enrollment in engineering increased over 100 students from 1985 to 1995. (See appendix table 4-16.)

Hispanics

Hispanic students increased their graduate science and engineering enrollment by 64 percent between 1985 (8,614) and 1995 (14,089). Students enrolling in science fields totaled 11,258 students in 1995, a 58 percent increase from 7,133 in 1985. Enrollment in all major fields of science increased between 1985 and 1995, except in agricultural sciences which decreased 10 percent. Biological science (1,810), psychology (2,777), and social science (4,221) have the largest numbers and proportions of Hispanic graduate students in science. (See figure 4-8.) Political science is the largest of the social science fields and comprised 14 percent of all Hispanic science and engineering student enrollment. Engineering enrollment for Hispanics increased 5 percent from 1,481 students in 1985 to 2,831 students in 1995. (See appendix table 4-17.)

Asians

Asian students increased their graduate enrollment in science and engineering by 117 percent, from 12,003 in 1985 to 26,015 in 1995. Asian graduate student enrollment in science fields in 1995 (16,897) increased 135 percent from 1985 (7,198), and doubled, tripled, and sometimes quadrupled within some fields. Asian student enrollment in engineering (9,118) increased 90 percent. The largest numbers of Asian engineering students are in the subfields of civil engineering (1,360), mechanical engineering (1,243),

and electrical engineering (3,762). Although the combined Asian enrollment in science and engineering yielded an increase of 8 percent between 1993 and 1995, there were decreases of about 400 students combined in various subfields of physical sciences, earth sciences, and engineering. (See appendix table 4-18.)

Whites

White students increased their science and engineering enrollment by 10 percent between 1985 (223,682) and 1995 (246,776). (See appendix table 4-19.) Students enrolling in science fields totaled 194,663 students in 1995, a 12 percent increase from 173,541 in 1985. For nearly half of the major fields in science, however, enrollment decreased. Engineering enrollment increased 4 percent between 1985 and 1995. White graduate student enrollment in science and engineering decreased 4 percent between 1993 and 1995; in engineering only, enrollment decreased 9 percent.

Unknown Race/Ethnicity

Graduate students in science and engineering whose race and ethnicity were not specified were 9 percent of U.S. citizen and permanent resident graduate students in 1985 and 6 percent in 1995 (a decrease in numbers of 29 percent), probably reflecting better reporting of race/ethnicity; however, this group increased 5 percent during 1993 to 1995. (See appendix table 4-20.)

Race by Gender

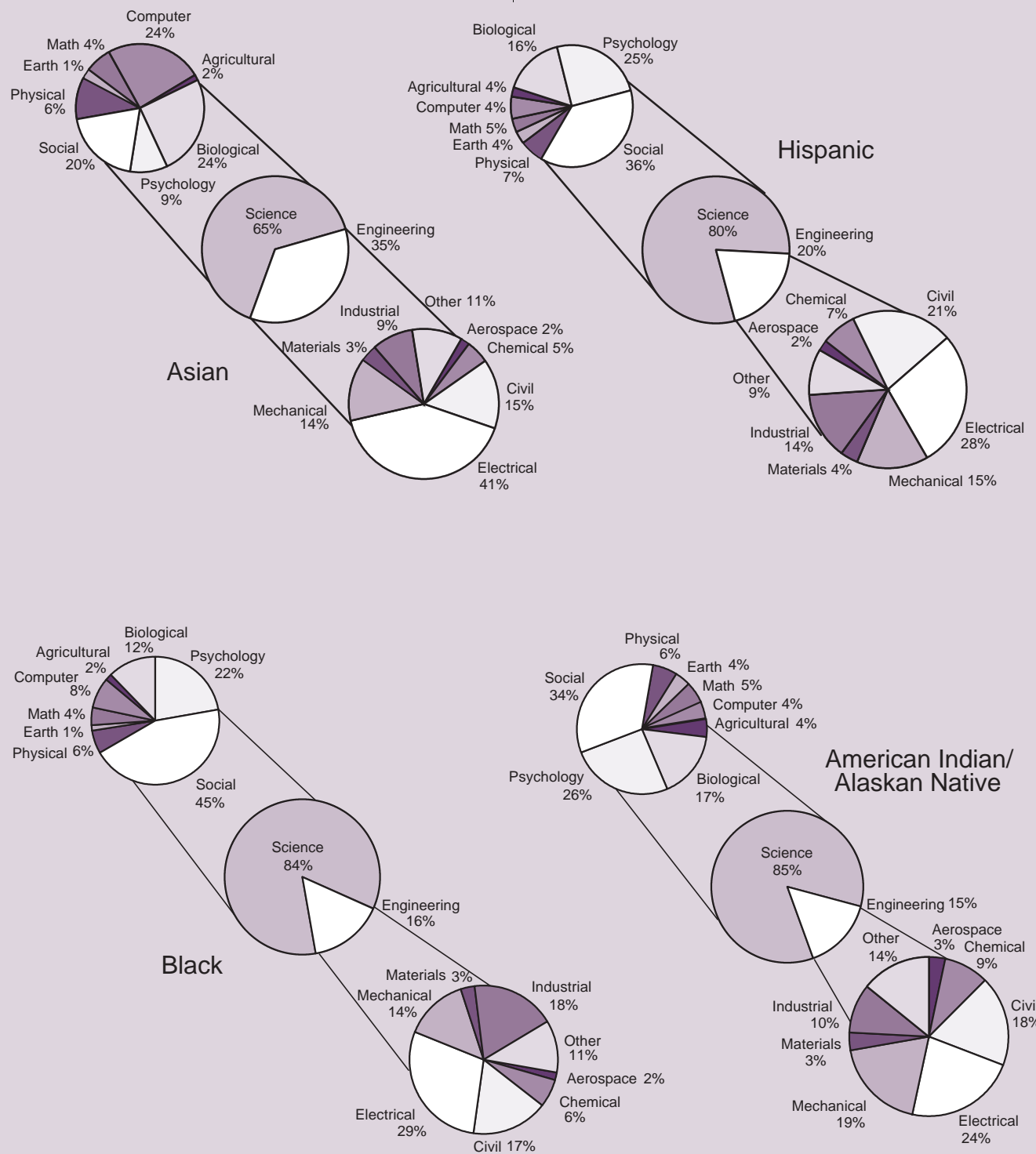
Of the 325,135 U.S. citizen and permanent resident science and engineering graduate students enrolled in colleges and universities in this country in 1995, 134,643 were female, representing 41 percent (see appendix table 4-21). Of the female science and engineering students in 1995, 21 percent were minorities; in 1994, 20 percent. Blacks represented 8 percent, American Indians 1 percent, Asians 7 percent, and Hispanics 5 percent. Of the male graduate science and engineering students (190,492) in 1995, the portion who were black was 4 percent, American Indians less than 1 percent, Asians 9 percent, and Hispanics 4 percent.

The enrollment of racial/ethnic minority graduate students is most prominent in the social sciences except for Asian students who are prominent in engineering fields. Black, American Indian, and Hispanic females tend to be concentrated in the social sciences, whereas Asian female students are concentrated in the biological sciences. White female students are in

³ Some of this increase may be due to changes in racial identification. Between the 1970 and 1980 censuses and between the 1980 and 1990 censuses, the number of American Indians increased in excess of natural increase because many multiracial persons who had not previously self-identified as American Indian changed their racial identity to American Indian (Eschbach et al. 1998).

Figure 4-8.

Science and engineering graduate students, by field of enrollment: 1995



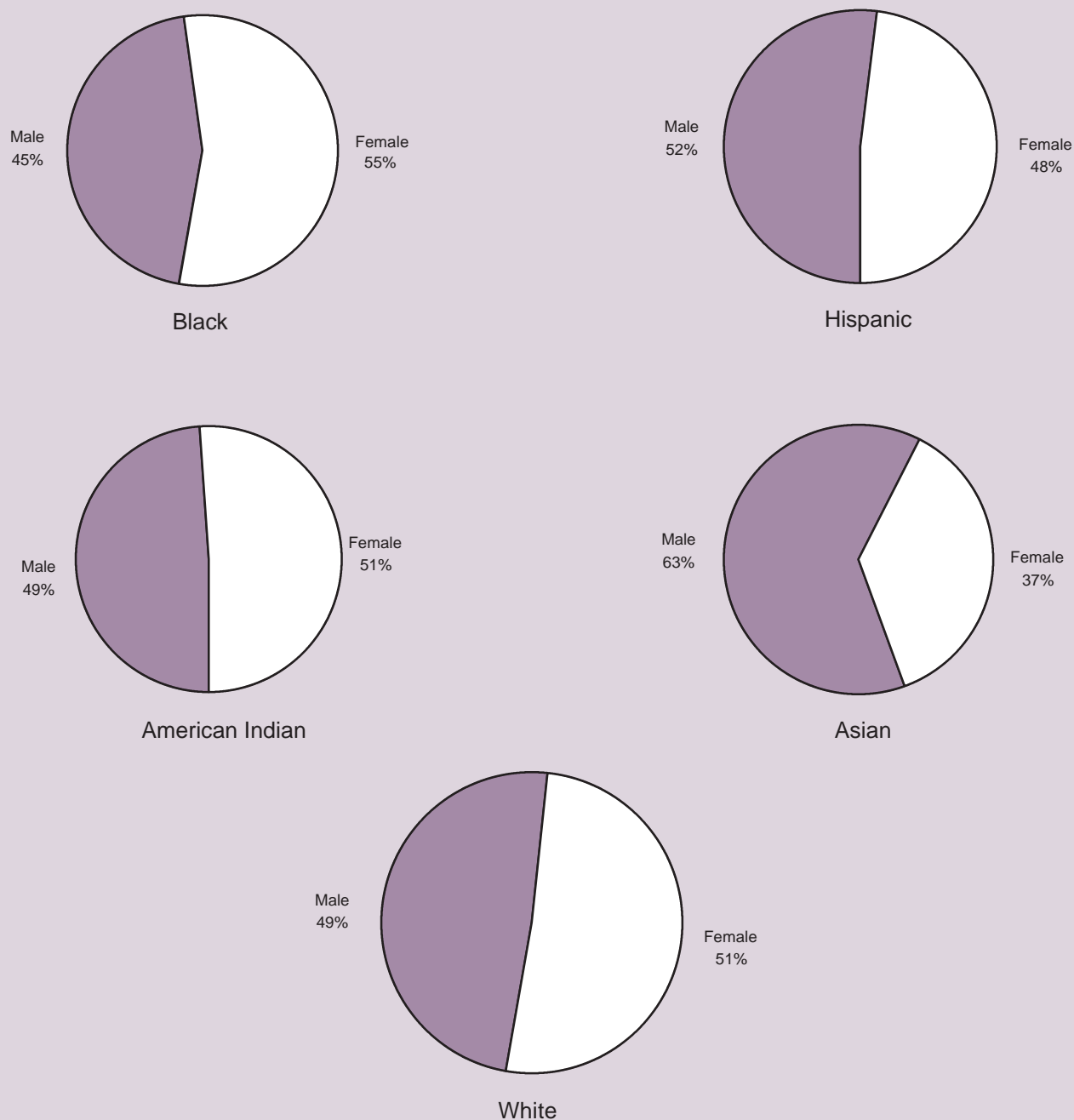
See appendix tables 4-15 to 4-18.

psychology and social sciences. Of the male graduate students, all minorities except Asian men are most heavily represented in social sciences. Asian and white males' enrollment is concentrated in engineering. Women were 55 percent of black science and engineering en-

rollment, 51 percent of American Indian science and engineering enrollment, 37 percent of Asian science and engineering enrollment, and 48 percent of Hispanic science and engineering enrollment. (See figure 4-9 and appendix table 4-21.)

Figure 4-9.

Science and engineering graduate students by race and gender: 1995



See appendix table 4-21.

Foreign

Foreign students enrolled in U.S. science and engineering graduate programs totaled 98,787 students in 1995, up 29 percent from 76,812 students in 1985. There were 63,300 foreign students enrolled in science fields, up 32 percent from 47,990 in 1985. Enrollment in all major science fields increased for foreign students between 1985 and 1995. Though enrollment in social sciences combined increased, enrollment in three social science fields decreased between 1985 and 1995; sociology (down 17 percent), linguistics (down 7 percent), and history of science (down 7 percent). Engineering enrollment for foreign students was up 23 percent between 1985 and 1995. Civil engineering (5,600), electrical engineering (11,308), and mechanical engineering (5,442) had the largest portions of foreign enrollment in the engineering fields. (See appendix table 4-22.)

Between 1993 and 1995, enrollment of foreign graduate students in science and engineering decreased 7 percent, science by 5 percent, and engineering by 10 percent. Foreign enrollment in all major science fields decreased during this period except for psychology, which was up 11 percent. Foreign enrollment in all engineering fields also decreased between 1993 and 1995. (See appendix table 4-22.)

Full Time and Part Time

In 1995, 68 percent of graduate science and engineering students were enrolled full time and 32 percent were enrolled part time. Among U.S. citizen and permanent resident graduate science and engineering students, 89 percent were full time and 11 percent were part time. (See appendix table 4-23.)

Between 1985 and 1995, minority U.S. citizen and permanent resident graduate students increased their full-time enrollment in science and engineering: black graduate students (91 percent); American Indian graduate students (122 percent); Asian graduate students (132 percent); and Hispanics (76 percent). Full-time foreign science and engineering graduate student enrollment increased by 27 percent between 1985 and 1995. Part-time enrollment for minority U.S. citizen and permanent resident graduate students, and for foreign students also increased between 1985 and 1995. Between 1993 and 1995, full-time foreign student and white U.S. citizen and permanent resident student enrollment decreased 7 percent and 2 percent, respectively. Part-time enrollment of Hispanic graduate students decreased between 1993 and 1995 by 3 percent, as did part-time enrollment of white graduate students (down 7 percent) and foreign graduate students (down 4 percent). (See appendix table 4-23.)

Pursuit of Graduate Study After the Bachelor's

Analysis of data from the National Science Foundation's National Survey of Recent College Graduates reveals that women and men are similar in their pursuit of graduate study after the bachelor's degree. Among 1993 science and engineering bachelor's degree recipients who were surveyed in 1995, 27 percent of women and 25 percent of men had a master's or higher degree or were enrolled full time in 1995. (See text table 4-1.) Although men and women in the aggregate were similar in their pursuit of graduate studies, differences existed within fields. For example, among those with a 1993 bachelor's degree in biological sciences, 41 percent of women, but 49 percent of men, had a master's or higher degree or were enrolled full time in 1995. In physical sciences, women were the more likely to pursue graduate study: 48 percent of women with a 1993 bachelor's degree and 40 percent of men had a master's or higher degree or were enrolled full time in 1995. Among those not pursuing further education, men and women gave, for the most part, similar reasons for not taking courses after graduation, although women were more likely than men to cite financial reasons (53 percent of women compared with

38 percent of men with bachelor's science degrees, and 37 percent of women compared with 30 percent of men with bachelor's engineering degrees). (See text table 4-2.)

Racial/ethnic groups are similar in their pursuit of graduate study after the bachelor's degree, with the exception of Asians. Among 1993 science and engineering bachelor's degree recipients, 34 percent of Asians had a master's or higher degree or were enrolled full time in 1995, compared to 26 percent of the total. (See text table 4-1.)

Persons with disabilities, who represent 2.4 percent of the 1993 bachelor's science and engineering graduates, were less likely than others to pursue graduate education or to be employed. Among 1993 science and engineering bachelor's degree recipients, 76 percent of those with disabilities were not students in 1995, compared to 67 percent of the total. (See text table 4-3.) Recent bachelor's graduates with disabilities were also less likely to be employed—30 percent were not employed in 1995 compared to 16 percent of the total.

Pursuit of Graduate Study After the Bachelor's (continued)

Text table 4-1.

Percent of 1993 science and engineering bachelor's degree recipients who have master's or higher degree and/or were enrolled full time, by sex, race/ethnicity, and field of degree: April 1995

Major field	Total recipients	Percentage having master's or higher as of April 1995 or enrolled full time on April 15, 1995							
		All	Sex		Race/ethnicity				
			Male	Female	White, non-Hispanic	Asian or Pacific Islander	Black, non-Hispanic	Hispanic	American Indian/Alaskan Native
<i>All science and engineering fields.....</i>	348,900	26	25	27	26	34	25	24	28
Major type									
Total science.....	290,500	28	28	28	28	36	26	25	31
Total engineering.....	58,400	18	18	18	15	31	20	17	S
Major field									
<i>Computer and mathematical sciences, total.....</i>	35,200	14	14	15	14	S	S	S	S
Computer science and information sciences.....	18,700	6	S	S	S	S	S	S	S
Mathematics and related sciences.....	16,500	24	26	21	24	S	S	S	S
<i>Life and related sciences, total.....</i>	58,600	40	43	38	39	50	49	35	S
Agricultural and food sciences.....	6,200	15	S	25	16	S	S	S	S
Biological sciences.....	50,000	45	49	41	44	52	50	40	S
Environmental life sciences including forestry sciences.....	2,500	S	S	S	S	S	S	S	S
<i>Physical and related sciences, total.....</i>	16,500	42	40	48	40	S	43	S	S
Chemistry, except biochemistry.....	8,600	50	46	54	47	S	S	S	S
Earth sciences, geology, and oceanography.....	3,900	26	26	S	25	S	S	S	S
Physics and astronomy.....	3,900	43	41	S	43	S	S	S	S
Other physical sciences.....	S	S	S	S	S	S	S	S	S
<i>Social and related sciences, total.....</i>	180,200	25	25	25	25	30	21	22	29
Economics.....	21,800	19	17	23	18	S	S	S	S
Political science and related sciences.....	44,700	33	32	34	35	S	S	S	S
Psychology.....	65,300	27	28	27	28	S	S	S	50
Sociology and anthropology.....	28,600	17	19	16	16	S	S	S	S
Other social sciences.....	19,800	20	21	19	18	S	S	S	S
<i>Engineering, total.....</i>	58,400	18	18	18	15	31	20	17	S
Aerospace and related engineering.....	2,300	28	28	S	25	S	S	S	S
Chemical engineering.....	4,300	18	20	S	13	S	S	S	S
Civil and architectural engineering.....	8,600	16	16	S	15	S	S	S	S
Electrical, electronic, computer, communications engineering.....	20,000	16	16	S	14	S	S	S	S
Industrial engineering.....	3,300	13	S	S	S	S	S	S	S
Mechanical engineering.....	13,900	15	15	S	12	S	S	S	S
Other engineering.....	6,100	30	28	S	26	S	S	S	S

KEY: S = Data with weighted values less than 100 or unweighted sample sizes less than 20 are suppressed for reasons of respondent confidentiality and/or data reliability.

NOTE: Details may not add to totals because of rounding. Percents calculated on unrounded data.

SOURCE: National Science Foundation/SRS, National Survey of Recent College Graduates, 1995.

Women, Minorities, and Persons With Disabilities in Science and Engineering: 1998

Pursuit of Graduate Study After the Bachelor's (continued)

Text table 4-2.

Percentage of 1993 science and engineering bachelor's degree recipients who have not taken courses since most recent degree and percent choosing selected reasons for not taking courses, by sex and field of degree: April 1995

Major field	Percentage not taking courses	Reasons for not taking courses								
		Achieved education goals	Waiting for term to start	Financial reasons	Had job; needed work	Family responsibility	Moved	Uncertain as to field	Needed break	Other
All science and engineering fields.....	57	69	6	43	82	12	10	23	51	5
Total science										
Male.....	59	69	6	38	82	11	7	20	49	5
Female.....	54	67	7	53	82	15	11	30	54	5
White, non-Hispanic.....	57	70	5	44	82	11	9	26	52	5
Black, non-Hispanic.....	53	45	12	58	84	24	9	17	51	5
Hispanic.....	54	62	11	44	79	19	11	35	55	6
Asian or Pacific Islander.....	51	71	15	51	83	14	9	22	44	3
American Indian/Alaskan Native.....	55	56	S	47	84	21	S	S	36	S
Total engineering										
Male.....	66	71	4	30	84	11	12	14	50	4
Female.....	57	64	9	37	83	9	14	29	54	5
White, non-Hispanic.....	65	72	4	30	84	9	13	15	53	5
Black, non-Hispanic.....	63	60	S	44	70	22	14	21	45	S
Hispanic.....	59	56	16	30	93	20	15	10	37	S
Asian or Pacific Islander.....	58	59	9	33	86	14	8	21	44	3
American Indian/Alaskan Native.....	58	95	S	S	S	S	S	S	S	S

KEY: S = Data with weighted values less than 100 or unweighted sample sizes less than 20 are suppressed for reasons of respondent confidentiality and/or data reliability.

NOTE: Details will not add to totals because respondents could choose more than one reason for not taking courses. Percents calculated on unrounded data.

SOURCE: National Science Foundation/SRS, National Survey of Recent College Graduates, 1995.

Women, Minorities, and Persons With Disabilities in Science and Engineering: 1998

Text table 4-3.

Enrollment, degree attainment, and employment status for the 1993 science and engineering bachelor's degree recipients: April 1995

Status	Total number	Enrollment status April 15, 1995						Degree attainment April 1995				Employment status April 15, 1995					
		Full-time student		Part-time student		Not student		Attained an MA or higher by April 30,		Not attained an MA or higher by April		Employed full time		Employed part time		Not employed	
		Number	%	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
<i>Recent Science and Engineering Graduates, total.....</i>	348,900	82,000	24	34,600	10	232,300	67	11,600	3	337,400	97	250,500	72	42,600	12	55,900	16
Women.....	162,600	40,600	25	18,500	11	103,500	64	4,700	3	157,900	97	109,900	68	22,900	14	29,800	18
Black, non-Hispanic.....	19,800	4,500	23	1,900	9	13,400	68	600	3	19,300	97	14,100	71	2,200	11	3,500	18
Hispanic.....	18,200	4,100	22	1,500	8	12,600	69	500	3	17,700	97	12,500	69	1,900	11	3,800	21
Disabled.....	8,400	1,100	13	S	S	6,400	76	S	S	8,300	99	4,500	54	1,300	16	2,500	30

KEY: S = Data with weighted values less than 100 or unweighted sample sizes less than 20 are suppressed for reasons of respondent confidentiality and/or data reliability.

NOTE: Details may not add to totals because of rounding. Percents calculated on unrounded data.

SOURCE: National Science Foundation/SRS, National Survey of Recent College Graduates, 1995.

Women, Minorities, and Persons With Disabilities in Science and Engineering: 1998

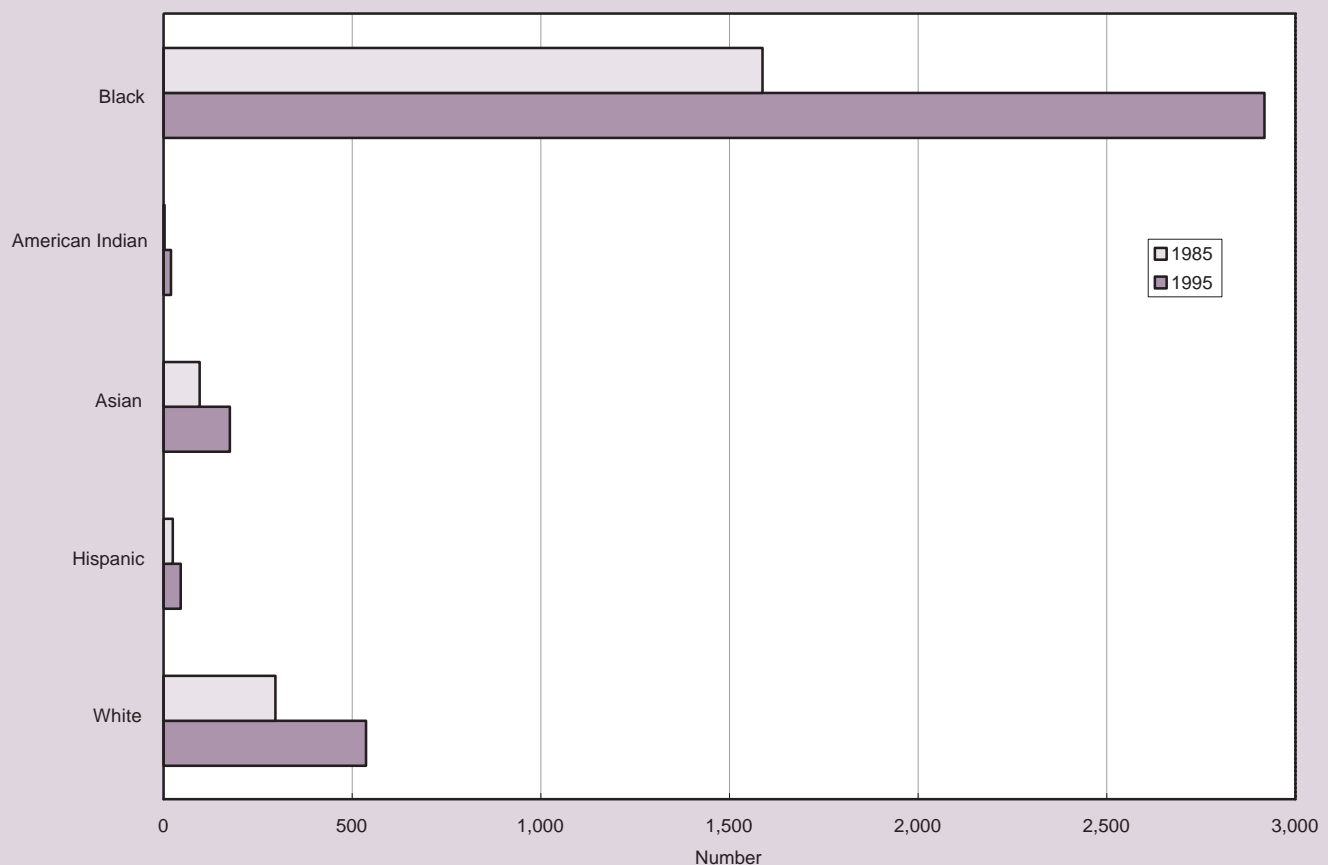
Historically Black Colleges and Universities

There were 3,834 U.S. citizen and permanent resident graduate science and engineering students enrolled in Historically Black Colleges and Universities (HBCUs) in this country in 1995, up 72 percent between 1985 and 1995. In 1995, black students were the largest portion of enrollment at 76 percent; American Indian students, 1 percent; Asian students, 5 per-

cent; Hispanic students, 2 percent; and white students, 14 percent. (See figure 4-10.) Within HBCUs in 1995, black student enrollment was concentrated in social sciences (32 percent), American Indian students in physical sciences (79 percent), Asian students in mathematical sciences (29 percent), Hispanic students in physical sciences and biological sciences (both 20 percent), and white students in psychology (26 percent). (See appendix table 4-24.)

Figure 4-10.

Science and engineering graduate students attending HBCUs: 1985 and 1995



See appendix table 4-24.

Women, Minorities, and Persons With Disabilities in Science and Engineering: 1998

Persons With Disabilities

About 3 percent of graduate students studying in all fields, science and engineering as well as non-science-and-engineering fields, reported a disability in 1996. (See appendix table 4-25.) Students with disabilities were more likely to be enrolled in health fields than students without disabilities, and were less likely to be enrolled in life and physical sciences and in engineering/computer science/mathematics fields.

Outcomes: Master's Degrees and Doctorates in Science and Engineering

Overview

Degrees marking the formal outcomes of graduate education are important credentials for those pursuing science and engineering careers. Data on these outcomes

provide benchmarks for measuring the progress of women and various racial/ethnic population groups in increasing their representation.

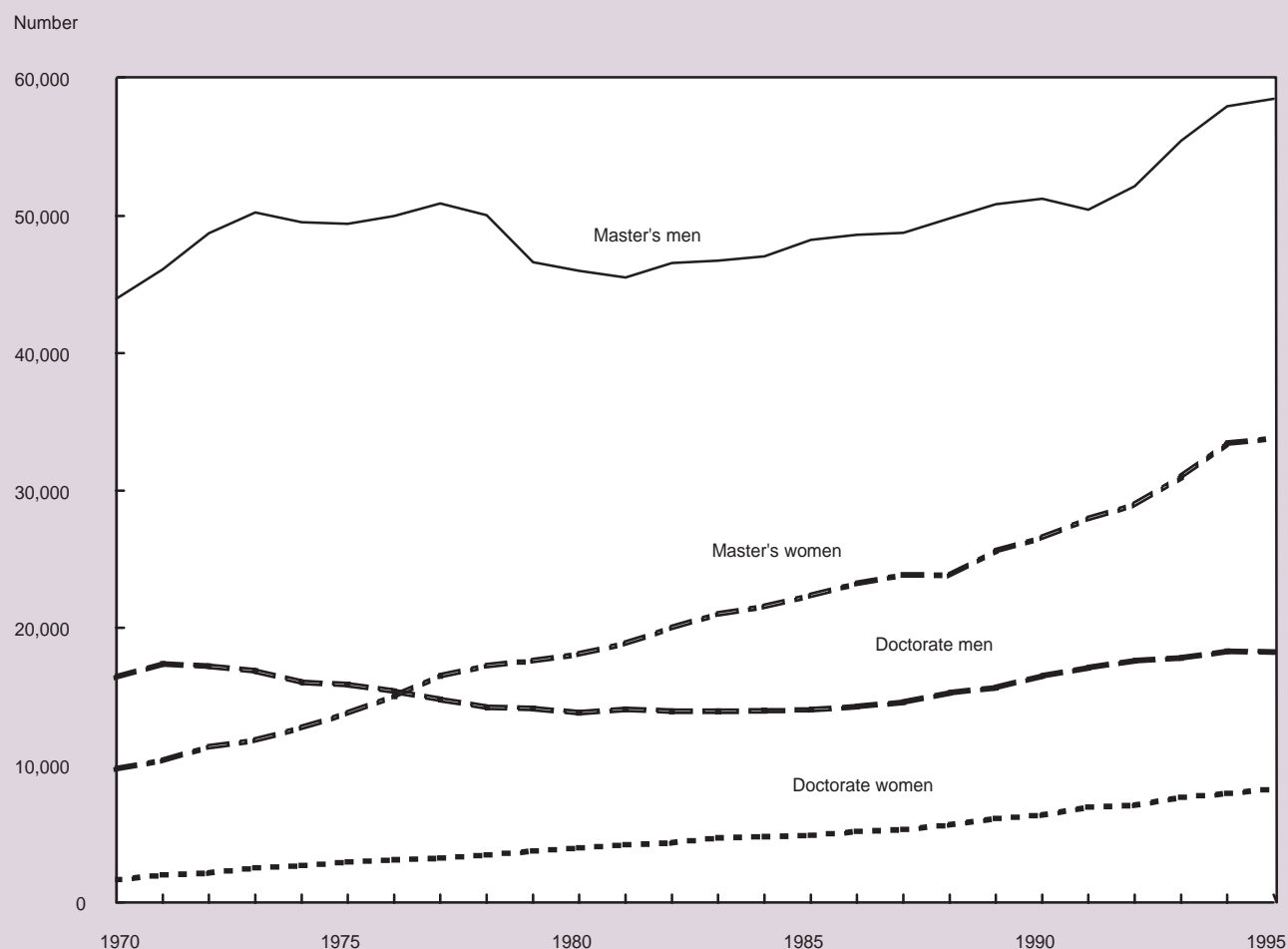
Graduate education has expanded significantly during the almost three decades between 1966 and 1995. The overall expansion in degrees awarded encompasses an uneven pattern of growth, however. For about 10 years, from the mid-1960s until the mid-1970s, growth was sustained and rapid; for approximately the next 10 years, increases in total degrees and in science and engineering degrees were much slower. The slowdown in science and engineering degrees, however, was almost exclusively caused by a decline until the early 1980s in the number of men earning these degrees.

The number of female science and engineering doctoral degree recipients increased in every year since

1966, and the number of female science and engineering master's degree recipients increased in every year but one. (See appendix tables 4-26, 4-27, and 4-28.) The pattern was different for men. After increasing from the outset, the number of master's degrees in science and engineering awarded to men decreased between 1974 and 1981 in all but 2 years. The number of master's degrees then began a period of growth so gradual that it took until 1990 to surpass the number of degrees awarded in any year during the 1970s. The pattern was similar but even more pronounced for male doctorate recipients in science and engineering. The number of degrees awarded decreased every year between 1972 and 1980. Following that decline it took until 1992 for the number of science and engineering doctorates awarded to men again to reach the total achieved in 1971. (See figure 4-11.)

Figure 4-11.

Total science and engineering master's and doctorate recipients by sex: 1970–1995



See appendix table 4-27.

Women, Minorities, and Persons With Disabilities in Science and Engineering: 1998

Notwithstanding the increased participation of women over the last three decades, traditionally more men than women have participated in advanced graduate education. As a result, in general the more advanced the degree, the lower the proportion of female degree recipients. For example, the proportion of the degrees awarded to women in both science and engineering fields and non-science-and-engineering fields was higher at the master's level than for the doctorate. The same pattern holds true for science and engineering degrees at the bachelor's/master's level: women as a percentage of all degree recipients was higher at the bachelor's degree level than at the master's degree level. Since 1988, however, that pattern has reversed for non-science-and-engineering degrees: women received a higher proportion of total master's degrees in non-science-and-engineering fields than the proportion they received for bachelor's degrees. (See appendix tables 4-26, 4-27, and 4-28.)

Women

Master's Degrees

Women have constituted at least half of all master's degree recipients since 1986. They have made great strides in their participation in science and engineering master's degrees over the last 10 years (although they continue to receive fewer science and engineering degrees than men). Women's science and engineering master's degrees increased by 60 percent over the 10-year period between 1985 and 1995. Their 35,791 degrees awarded in 1995 were 38 percent of the total science and engineering degrees in that year, up from 22,331, or 32 percent of the total, in 1985. In contrast, since 1975 women have received the majority of all non-science-and-engineering master's degrees. They received 60 percent of the total non-science-and-engineering master's degrees in 1995, up from 56 percent of the total 10 years earlier. Women received a higher *number* of non-science-and-engineering degrees throughout this period, but the increase was at a slower *rate* than for those in science and engineering—52 percent, from 121,166 in 1985 to 184,439 in 1995. (See appendix table 4-29.)

Science Master's Degrees

The number of master's degrees awarded to women in all sciences increased 55 percent over the 10-year period between 1985 and 1995. This increase exceeded the 35 percent increase in natural sciences,⁴ in which

the numbers increased from 7,731 in 1985 to 10,428 in 1995. (The greater increase in all sciences combined was due to larger increases in the number of women in psychology and the social science fields.) (See appendix table 4-29.)

Natural Sciences

Women as a proportion of all natural science master's degree recipients rose from 32 percent of the total in 1985 to 36 percent in 1995. The total number of recipients of degrees in earth, atmospheric, and ocean sciences decreased for both men and women over the 10-year period, but the decrease was faster for men (27 percent fewer degrees, to 994 in 1995) than for women (13 percent fewer, to 451 in 1995). Mathematics and computer sciences were the only fields in which women had a smaller share of the total master's degrees in 1995 than they did in 1985, although the change was minimal: their proportion of degrees awarded decreased from 31 to 30 percent of the total number in those fields. This decrease in *proportion* came despite an increase in absolute *numbers* (from 3,053 in 1985 to 4,365 in 1995). Thus, although an increased number of women were interested in pursuing master's degrees in mathematics and computer science, these disciplines continued to be even more attractive to men.

Psychology and the Social Sciences

Women increased their proportion of total master's degrees in psychology, rising from 63 percent of total master's degrees awarded in that field in 1985 (5,417) to 72 percent of the total in 1995 (9,397). Social sciences degrees awarded to women also increased over the 10-year period, from 6,939 in 1985 to 11,334 in 1995 (representing an increase from 40 to 49 percent in the proportion of the total social science degrees awarded to females in 1985 and 1995).

Engineering Master's Degrees

The largest percentage increase in master's degrees awarded to women was in engineering (a 106 percent increase over the 1985–1995 period), although women constituted a smaller percentage of degrees in engineering than in any other major field (16 percent of total master's degrees in 1995). Nevertheless, the number of women receiving engineering master's degrees more than doubled in the 10-year period, from 2,244 in 1985 to 4,632 in 1995. (The numbers of men receiving master's degrees in engineering, although still in the majority, increased only 28 percent in numbers over the same 10-year period, from 18,728 in 1985 to 23,998 in 1995.)

⁴ The social sciences and psychology are excluded from the tabulation of natural sciences, but are included in the tabulation of all sciences.

Doctoral Degrees

Doctoral Degrees in All Fields

In both science and engineering and non-science-and-engineering fields, the proportion of degrees awarded to women in 1995 was lower for the doctorate than for the master's degree. (See figure 4-12.) The increase since 1985 in the number of doctoral degrees awarded in every major field was, however, higher for women than for men. As a result, women increased their proportionate share of all doctoral degrees over the 10-year period. (See figure 4-13.)

The total number of doctorates awarded in all fields increased by 33 percent since 1985 (see appendix table 4-30), but the increase for women was faster—52 percent over the same time period. Women received 16,333 doctoral degrees in 1995, 39 percent of the doctorates awarded; this was up from 34 percent of the total in 1985. (See appendix table 4-31.) Women have earned the majority of non-science-and-engineering doctoral degrees since 1989. The *proportion* of the non-science-and-engineering degrees awarded to women increased from 47 percent in 1985 to 53 percent in 1995. The 8,060 female doctorate recipients in the non-science-and-engineering fields were particularly concentrated in education, where they received 62 percent of the education

doctorates in 1995, and in health degrees,⁵ where 63 percent of the degrees were awarded to women. (See appendix table 4-32.)

Doctoral Degrees in Science and Engineering

Interestingly, although women make up a greater percentage of non-science-and-engineering doctorate recipients, since 1993 women have received more science and engineering doctoral degrees than non-science-and-engineering doctoral degrees. The number of science and engineering doctoral degrees awarded to women increased faster than the increase in non-science-and-engineering degrees—69 percent versus 38 percent over the 10-year period. The *proportion* of total science and engineering doctoral degrees that were awarded to women increased from 26 percent of total science and engineering degrees in 1985 to 31 percent in 1995. (See appendix table 4-32.)

Science Doctoral Degrees

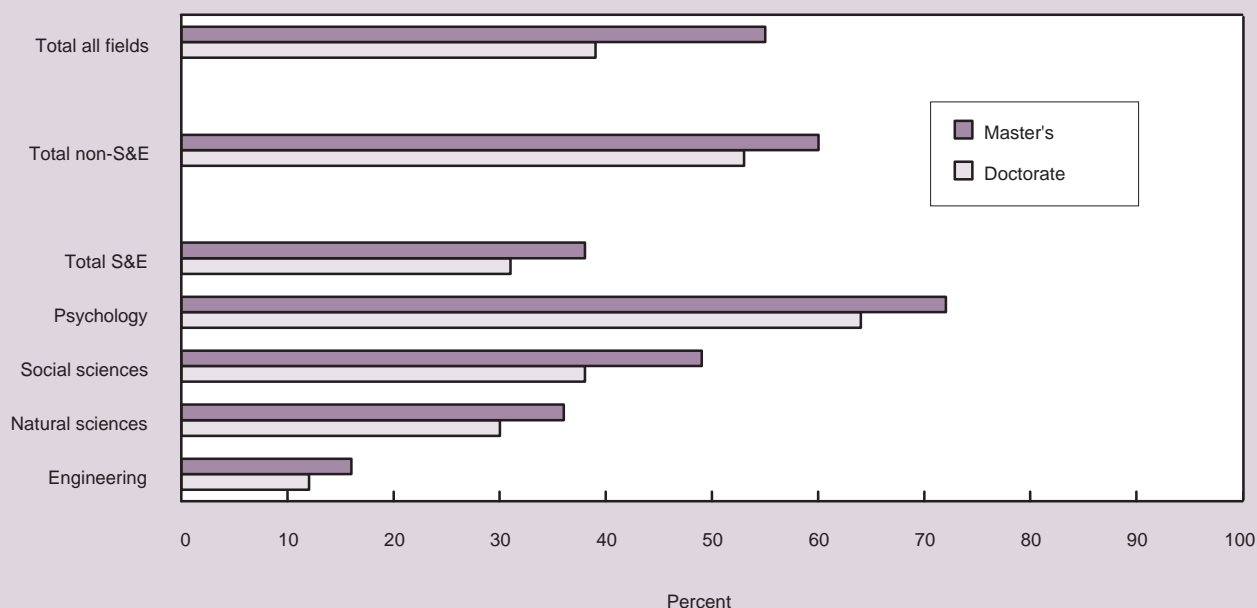
Psychology and the Social Sciences

Psychology was the only science and engineering field in which women received more doctorates than

⁵ Health fields include such fields as nursing, pharmacy, veterinary medicine, public health, and epidemiology.

Figure 4-12.

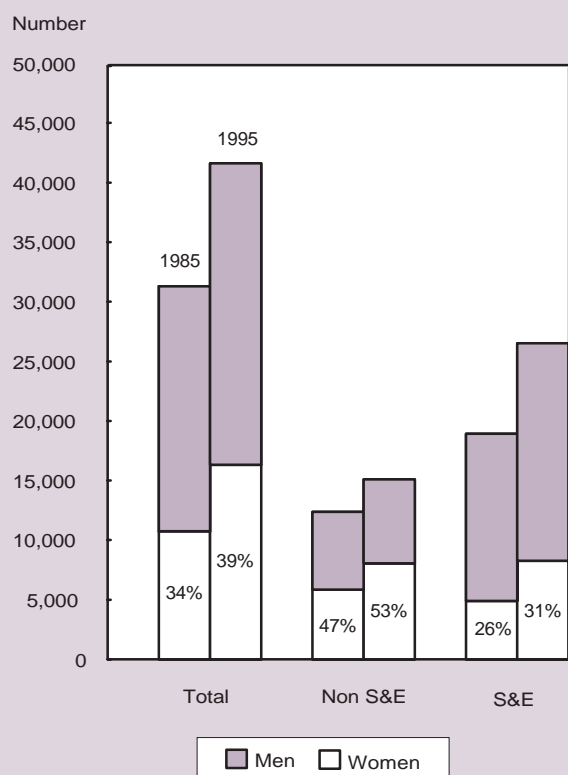
Women as a percent of master's and doctorate recipients, by major field: 1995



See appendix tables 4-26 to 4-28.

Women, Minorities, and Persons With Disabilities in Science and Engineering: 1998

Figure 4-13.
Total doctoral degrees awarded and percentage received by women: 1985 and 1995



See appendix tables 4-26 to 4-28.

Women, Minorities, and Persons With Disabilities in Science and Engineering: 1998

men. Of all doctoral degrees awarded in psychology, the proportion awarded to women rose from 51 percent in 1985 to 64 percent in 1995. Women received 38 percent of the social science degrees overall in 1995, but their participation within the *subfields* of the major field of social science was not even. For example, although women received 24 percent of the economics degrees, they received 58 percent of all the anthropology doctoral degrees and 53 percent of the sociology degrees. (See appendix table 4-31 for a detailed breakdown by major field and subfield of women's participation in doctoral degrees.)

Natural Sciences

Women received 30 percent of the doctorates in the natural sciences in 1995. Within that category they received 41 percent of the biology degrees and 23 percent of total physical sciences degrees. Physical sciences included 31 percent of the chemistry degrees and 17 percent of the astronomy degrees

but only 12 percent of the physics doctoral degrees awarded in 1995. Women earned 22 percent of three other natural science disciplines: earth, atmospheric, and ocean sciences; mathematics; and agricultural sciences. They received 19 percent of the computer science degrees. (See figure 4-14.)

Engineering Doctoral Degrees

The smallest proportion of women doctorate recipients in any broad field was in engineering. Men earned 5,313 engineering doctoral degrees in 1995 whereas women earned 694 engineering degrees, just 12 percent of the total engineering doctorates. This figure represented a sizable increase over the 10-year period, however; women had earned only 7 percent of the engineering doctorates in 1985. The distribution of women is not equal within the various engineering subfields. The highest absolute number of engineering doctorates awarded to women in 1995 was in electrical engineering (173), but women constituted only 10 percent of the total 1,731 degrees conferred. The next highest number of female doctorates in engineering was in chemical engineering (109), but they represented only 15 percent of the total 708 chemical engineering degrees awarded in 1995.

Proportionately the highest concentration of women in engineering was in those subfields that were related in some way with health matters; nevertheless, even in these subfields the number of women was also very small. For example, women constituted 25 percent of the doctorate recipients in bioengineering/biomedical engineering, but the total was only 48 women. Similarly, 25 percent of environmental health engineering doctorates were awarded to women, but the absolute number receiving those degrees was even smaller—21 women doctorates. (See appendix table 4-32.)

The Top 50 Institutions Granting Science and Engineering Doctorates to Women

The top 50 institutions, ranked by the number of science and engineering doctorates earned by women, awarded 52 percent (4,308) of all the science and engineering doctorates awarded to women in 1995 (8,273). Women received the majority of doctorates in only two of those institutions, however.⁶ Overall, women received 30 percent of the doctoral degrees awarded by these institutions in 1995. They received 35 percent of the science doctoral degrees at these institutions, much higher than the proportion of engineering doctorates they received at the same institutions (12 percent). (See appendix table 4-33.)

⁶ The California School of Professional Psychology at Los Angeles and at San Diego.

Financial Support for the Training of Women Doctorate Recipients

External financial support during doctoral study is often crucial for completion of the degree; few students and/or their families can pay all the bills on their own. Because it is important to track the sources of support for doctorate recipients, each year a question on the Survey of Earned Doctorates asks doctorate recipients to list the source of their *primary* means of support. In 1995, about half of the women (49 percent) reported that they were supported by university-administered support mechanisms (teaching and research assistantships,⁷ and fellowships and traineeships). The other half (51 percent) were

supported through “other” means. “Other” mechanisms include self-, family-, or industry-financed costs or loans.⁸ (See appendix table 4-34.)

University-Administered Means of Support

More doctoral recipients were supported by research assistantships than by any other university-administered mode of support: 32 percent of all men and 25 percent of all women. The second highest category of university-administered support mechanisms was teaching assistantships: 13 percent of women and 14 percent of men received this form of support as their primary source of money throughout the doctoral degree process. In addition, 11 percent of women and 8 percent of men received traineeships or fellowships as their primary means of support.

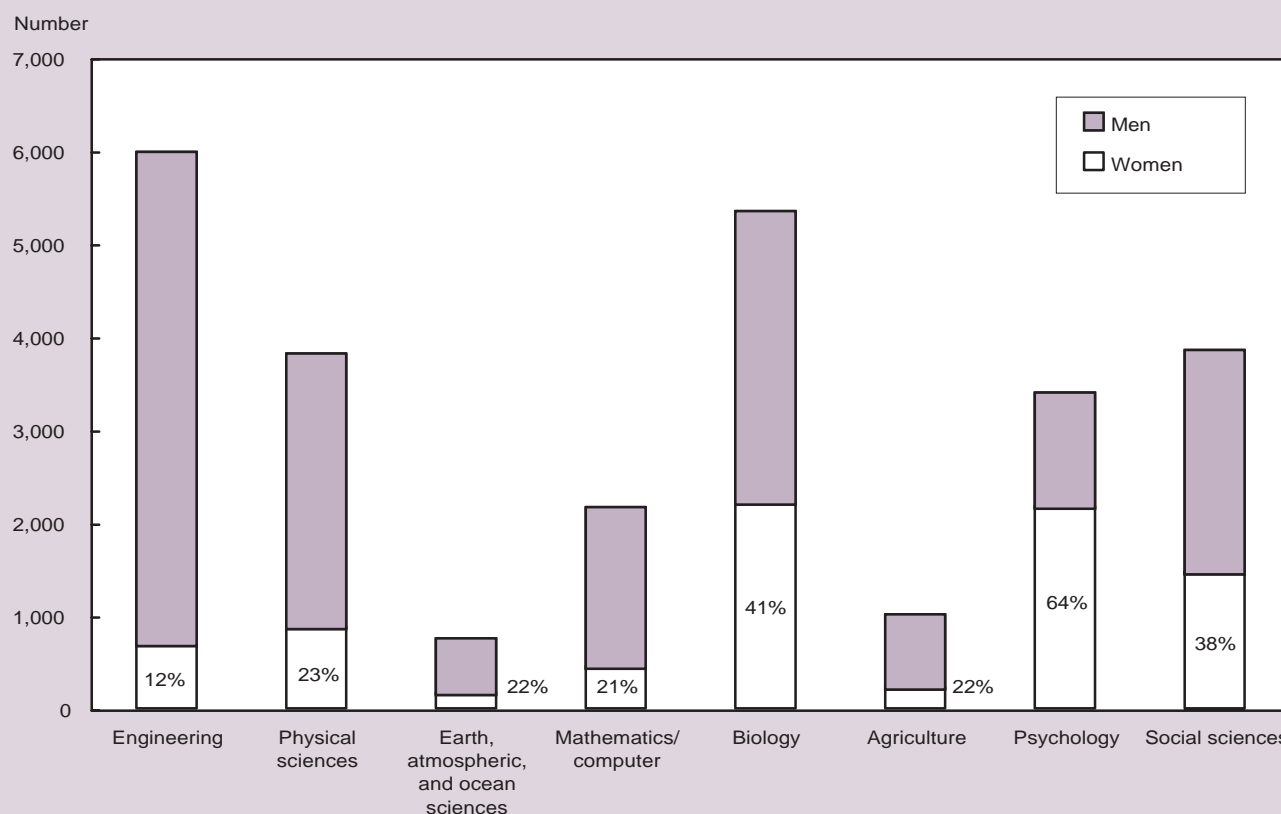
In general, the proportion of each sex receiving these modes of support was roughly even with the proportion

⁷ Because a respondent to the survey may not know the true source of research assistantship support, all research assistantships are classified here as being university-administered. The Federal government or State governments may have been the primary source for the funds for some of these assistantships, however.

⁸ The tabulation of this “other” category also included those who did not answer the question.

Figure 4-14.

Number of science and engineering doctoral degrees awarded and percentage received by women: 1995



See appendix table 4-31.

of each sex who received doctoral degrees. For example, women constituted 31 percent of the science and engineering doctorates in 1995, and they received 26 percent of the research assistantships and 30 percent of the teaching fellowships. They earned slightly more than their proportional share of all fellowships and traineeships (40 percent).

In three fields—physical sciences, engineering, and biology—over 60 percent of the women doctorate recipients received their primary support from one of the four university-administered methods, rather than their own resources or other support mechanisms. In contrast, psychology and social sciences had the lowest proportion of women receiving one of the four university-administered methods of support.

Baccalaureate Origin Institutions

Large universities enroll the greatest number of undergraduate students and, therefore, would be expected to be the baccalaureate origin of the majority of students who go on to earn higher degrees, but liberal arts colleges in general, and women's liberal arts colleges in particular, also play an important role in the education of women receiving bachelor's degrees who continue their education and subsequently earn doctorates in science and engineering.

The list of the 50 baccalaureate-granting institutions that awarded the greatest number of baccalaureate degrees to women who subsequently earned science and engineering doctorates between 1991 and 1995 is shown in appendix table 4-35.⁹ The list includes liberal arts colleges and women's colleges as well as large universities. These 50 academic institutions were particularly strong in the science and engineering preparation of women undergraduates. In 39 of those 50 baccalaureate-origin institutions, of all the female graduate students who went on to receive a doctorate degree of any kind, a majority earned those doctorates in science and engineering fields. It is interesting to note that the remaining 11 baccalaureate-origin institutions were all universities; that is, of those institutions in which the majority of female undergraduates who went on to receive a doctorate degree received those doctorates in non-science-and-engineering fields, none were liberal arts colleges or women's liberal arts colleges.

⁹ For corresponding data for racial/ethnic minority groups, see "Undergraduate Origins of Recent (1991–1995) Science and Engineering Doctorate Recipients" (NSF 96-334). Also, see tables 12, 14a, 14b, 14c, and 15.

Psychology—which had the highest percentage of women recipients—had the highest percentage supported by "other" sources: just 28 percent of the female doctorates (and 31 percent of the male doctorates) reported one of the listed four university-administered mechanisms as their primary means of support.

It is through research assistantships that many students are able to enter into mentoring situations, and research assistantships are often an opportunity to participate in complex cutting-edge research. Obtaining a research assistantship is thus a very helpful early step leading to a future research career. For this reason research assistantships are carefully monitored by academic policymakers. The highest percentage of research assistantships offered in any field was in the physical sciences: 44 percent of the 1995 doctorate recipients in this field received their primary means of support from research assistantships. Forty-two percent of the women doctorate recipients and 44 percent of the men cited this method as their primary support. Next highest in proportion offering research assistantships was engineering. Forty-seven percent of all the women engineering doctorate recipients mentioned this as their primary mode of support (versus 42 percent of the men). In contrast, only 11 percent of women psychology recipients (and 12 percent of men) reported receiving research assistantships as their primary means of support. Social sciences had the smallest percentage receiving research assistantships—11 percent of both women and men.

Postgraduation Plans

With few exceptions, the postgraduation plans of women and men science and engineering doctorate recipients who were U.S. citizens and permanent residents were remarkably similar in proportion—63 percent of the women and 62 percent of the men had definite postgraduation plans at the time of graduation. Roughly one-quarter of the doctoral recipients planned postdoctoral study (27 percent of the women and 25 percent of the men). Seventeen percent of the women planned academic employment, and 13 percent of the men had those plans. The percentage going into industry was nearly twice as high for the men as for the women, however: 14 percent of men planned industrial employment versus 8 percent for women. (See appendix table 4-36.)

In 1995, women constituted 36 percent of the doctorate recipients who were U.S. citizens and permanent residents, and they constituted 37 percent of the doctorate recipients who had firm postgraduation plans. The percentages for their participation in each of the postgraduation options were generally close to their proportionate sizes with two exceptions: women were planning only 25 percent of all the entrances into industry for

science and engineering doctorates, and they constituted just 26 percent of all those planning employment abroad. (See appendix table 4-36.)

Forty-three percent of the science and engineering doctorate recipients entering academic employment in 1995 were women, higher than their overall percentage of 36 percent of the science and engineering doctorates. These percentages of postgraduation plans parallel overall employment data taken from the 1995 Survey of Doctorate Recipients, in which 46 percent of instructor/lecturers were women. (The proportion of women decreases as the faculty rank gets higher. In 1995, for example, women constituted only 15 percent of tenured faculty. They made up 24 percent of faculty who were associate professors and 11 percent of the faculty who were full professor appointments.¹⁰)

Minorities

Master's Degrees

Master's Degrees to Nonresident Aliens Versus U.S. Citizens and Permanent Residents

In 1995, 399,428 master's degrees were awarded in the United States; 88,431, or 22 percent, were in science and engineering fields. (See appendix table 4-37.) The pattern of science and engineering degrees awarded to nonresident aliens was different from the pattern for U.S. citizens and permanent residents: nonresidents had a higher concentration in science and engineering fields. They received 12 percent of the total master's degrees in 1995, but 24 percent of the master's degrees in science and engineering fields.

The field with the highest concentration of nonresident aliens was computer science, in which they received 38 percent of total master's degrees, up from 24 percent in 1987. The second highest concentration was in engineering, where nonresidents received 34 percent of the total master's degrees awarded in 1995 (up from 26 percent in 1987).

Master's Degrees to U.S. Citizens and Permanent Residents¹¹

In contrast, the bulk of master's degrees awarded to U.S. citizens and permanent residents were in non-science-and-engineering fields; just 19 percent of the

total, or 67,110, were awarded in science and engineering fields. (See appendix table 4-37.) Since 1987 the increase in non-science-and-engineering degrees awarded (34 percent over the 8-year period) was more rapid than the increase in science and engineering fields (25 percent during the same time span).

Master's Degrees by Racial/Ethnic Group

In 1995, whites earned the highest number of master's degrees in both science and engineering fields and non-science-and-engineering fields. Asians earned the next largest number of science and engineering degrees, followed in order by blacks, Hispanics, and American Indians. (See appendix table 4-37.) That hierarchy has not changed over the 8-year period since 1987, but there have been changes in many fields in the proportion of the total held by each racial/ethnic group.

The largest change was in computer science. Whites and American Indians experienced decreases since 1987 in the number of computer science degrees earned. Whites had an 11 percent drop in degrees from 4,717 in 1987 to 4,205 in 1995. American Indians experienced a 27 percent decrease in degrees (although the number was small—from 22 recipients in 1987 to 16 in 1995). All the other racial/ethnic groups increased the number of their recipients of computer science degrees: blacks (from 207 to 347, a 68 percent increase), Hispanics (from 123 to 198, a 61 percent increase), and Asians (from 779 to 1,239, a 59 percent increase). Asians increased their *proportion* of computer science degrees the most—from 12 percent of total degrees in 1987 to 19 percent in 1995).

With the exception of the decrease for American Indians in computer sciences and a 3 percent decline in the number of biological science master's degrees for blacks, every minority group had an increase in both the percentage of degrees awarded and the number of total master's degrees awarded in every field between 1987 and 1995. As a consequence, there was a decrease in the *percentage* of total degrees awarded to whites in every field. There was also a decrease in the *number* of degrees they received in computer science, physical sciences, and biological sciences. The actual number of degrees awarded to whites increased in all other fields.

Women Master's Degree Recipients by Racial/Ethnic Group

Women as a Percentage of Each Racial/Ethnic Group

Women who were members of underrepresented minority groups received a higher proportion of total science and engineering master's degrees awarded to

¹⁰ There are many reasons for the smaller proportion of women in the higher academic faculty posts. See discussion of academic employment in chapter 5.

¹¹ Beginning in 1987, there was a change in the way racial/ethnic questions were asked of master's degree recipients; therefore no consistent comparisons can be made with data earlier than 1987. The discussion of master's trend data by race/ethnicity of recipients includes only the period between 1987 and 1995. (A full 10-year trend was presented above for all doctorate data and for master's degree data by sex of recipients.)

their respective racial/ethnic group than did either white women or Asian women. Black women were the only women in any racial/ethnic group to earn a majority of science and engineering master's degrees—in 1995, they earned 54 percent of those master's degrees awarded to blacks. American Indian women had the next highest proportion, 49 percent of all science and engineering master's degrees awarded to American Indians. Hispanic women earned 44 percent of all science and engineering degrees awarded to Hispanics. Whites and Asians—the two groups that had the highest proportion of total degrees in science and engineering—had the lowest proportion of female science and engineering master's degree recipients. White women earned 41 percent of all science and engineering master's degrees awarded to whites, and Asian women earned just 34 percent of science and engineering master's degrees earned by Asians.

Black women earned 30 percent of all the engineering master's degrees awarded to blacks—the highest proportion of engineering degrees of all the female racial/ethnic groups. Asian women were the next highest, earning 21 percent of engineering degrees awarded to Asians. Hispanic women were third highest with 19 percent. White women earned 16 percent of the total number of engineering master's degrees awarded to whites. American Indian women earned by far the smallest proportion of engineering degrees for a racial/ethnic group—only 7 percent of engineering master's degrees awarded to American Indians were awarded to females. (See appendix table 4-38.)

Women in Racial/Ethnic Groups as a Percentage of All Women Science and Engineering Degree Recipients

White women earned 77 percent of all the science and engineering master's degrees awarded to women. Their proportion of the total in each field was generally close to their proportion in the overall female population for most disciplines except for computer science, where they constituted only 56 percent of all women master's recipients. (See appendix table 4-38.)

Asian women represented approximately 7 percent of all female master's degree recipients in science and engineering, but 27 percent of the computer science degrees and 17 percent of the engineering degrees awarded to women. Proportionately more Asian women received computer science degrees than other degrees—23 percent of all Asian women earned their science and engineering master's degrees in computer science.

Women in the underrepresented minority groups received their science and engineering master's degrees in various fields in approximate proportion to their representation in the total: blacks (7 percent), Hispanics (4 percent), and American Indians (less than 1 percent).

Doctoral Degrees

Doctoral Degrees to Nonresident Aliens Versus U.S. Citizens and Permanent Residents

It is important to note that (similar to master's degrees) there was also a difference to the pattern of doctoral degrees awarded to nonresident aliens versus those awarded to U.S. citizens and permanent residents. The total number of doctoral degrees awarded to nonresident aliens increased by 68 percent between 1985 and 1995 (from 5,227 to 8,806); this increase was higher than the 29 percent rise in doctorates awarded to U.S. citizens and permanent residents over the same 10-year period (from 24,694 in 1985 to 31,910 in 1995). As a result, nonresident aliens constituted 21 percent of total doctorate recipients in 1995, up from 17 percent in 1985. These individuals are very interested in pursuing doctoral degrees in science and engineering. Seventy-nine percent of the nonresident aliens acquiring doctoral degrees in the United States in 1995 chose science and engineering fields. This percentage was much higher than the science and engineering proportion of total degrees awarded to U.S. citizens and permanent residents—59 percent. (See figure 4-15.) Twenty-nine percent of the nonresident aliens awarded doctoral degrees received their degrees in engineering versus 10 percent of the doctorate recipients who were U.S. citizens and permanent residents.

Nonresident aliens received 21 percent of doctoral degrees overall, but 42 percent of all the engineering doctoral degrees awarded in 1995 and 25 percent of the natural science degrees. They received only 5 percent of the psychology degrees, 12 percent of social science degrees, and 12 percent of the non-science-and-engineering degrees.

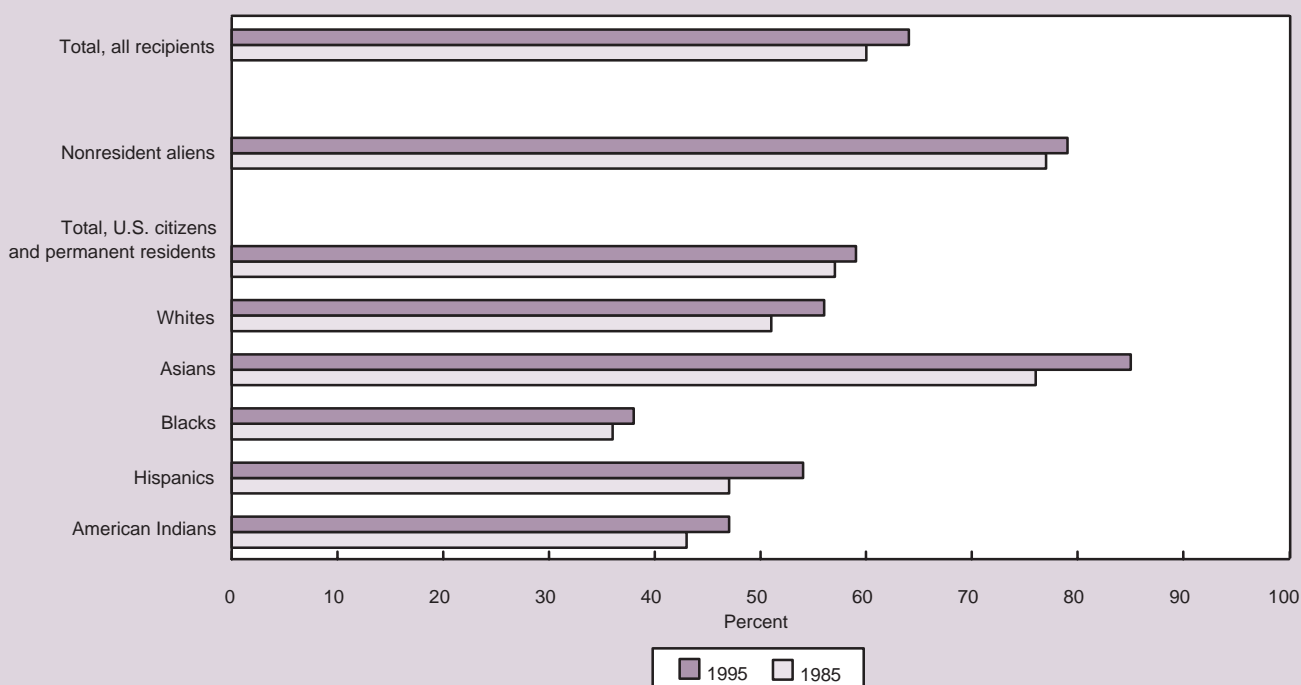
Doctoral Degrees Awarded to U.S. Citizens and Permanent Residents by Racial/Ethnic Group¹²

Doctoral Degrees in All Fields

All racial/ethnic groups enjoyed an increase in the total number of doctoral degrees between 1985 and 1995. Although the percentage increases were very

¹² The data in this section are taken from the annual Survey of Earned Doctorates. In discussing the changes in achievement by the various ethnic groups within the U.S. citizens and permanent residents group, it must be noted that some degree recipients did not fill in the racial/ethnic question on the survey. The number of these recipients, labeled "U.S. citizens and permanent residents—race/ethnicity unknown" decreased by two-fifths between 1985 and 1995, from 376 to 222. This decrease reflects an apparent increase in the willingness of doctorate recipients to report their race/ethnicity. It is not known what proportion of the previously unreported category now is reflected in each of the various racial/ethnic groups; therefore, some of the increases described in this section may also reflect the more accurate reporting patterns of the doctorate recipients. Nevertheless, there was an increase in science and engineering degrees awarded to every racial/ethnic group between 1985 and 1995.

Figure 4-15.
Science and engineering degrees as a percentage of total doctoral degrees awarded, by racial/ethnic group: 1985 and 1995



See appendix table 4-30.

Women, Minorities, and Persons With Disabilities in Science and Engineering: 1998

different, Asians had the largest percentage growth of all the racial/ethnic groups—their total degrees awarded increased fourfold, from 1,070 in 1985 to 4,300 in 1995. (See appendix table 4-30.) The increases in doctorate recipients for each one of the underrepresented minority groups were higher than the increase for whites, but none of those increases matched the rate of increase in Asian degree recipients. Of the underrepresented minorities, blacks received the highest number of doctoral degrees overall. In 1995 they received 1,455 doctoral degrees, a 40 percent increase over the 1,043 doctoral degrees awarded to blacks in 1985. Blacks accounted for approximately 3 percent of total doctoral degrees awarded in 1995 and 5 percent of the degrees awarded to U.S. citizens and permanent residents. (See appendix table 4-30.)

Hispanics received 1,055 doctoral degrees in 1995, a 66 percent increase over the 634 received in 1985. Similar to the overall proportion of doctorate recipients for blacks, Hispanics also accounted for approximately 3 percent of total doctoral degrees awarded and 5 percent of degrees awarded to U.S. citizens and permanent residents. (See appendix table 4-30.)

American Indians received 148 doctoral degrees in 1995, a 54 percent increase over the 96 degrees

received in 1985. American Indians made up less than 1 percent of both total doctoral degrees and doctoral degrees awarded to U.S. citizens and permanent residents.

Doctoral Degrees in Science and Engineering

As with total doctoral degrees, there was a general increase in the popularity of science and engineering degrees in the decade since 1985, but the increase was not uniform among the various racial/ethnic groups. All minority racial/ethnic groups had a greater percentage increase in science and engineering doctoral degrees than whites. Although whites received the highest number of doctoral degrees in both 1985 and 1995 (21,306 and 24,608, respectively), they experienced the smallest percentage increase of any racial/ethnic group over the 10-year period (16 percent). (See appendix table 4-39 for 10-year trends by detailed field.)

In both 1985 and in 1995, Asians received the second highest number of science and engineering doctoral degrees awarded to any racial/ethnic group, but the number of those degrees awarded to Asians increased 353 percent during that time period, from 809 degrees in 1985 to 3,666 in 1995. As shown in appendix table 4-39, the largest increase in Asian doc-

Latino Experiences in Graduate Education

In a study supported by the Council of Graduate Schools and funded by the Ford Foundation, cultural anthropologist Robert A. Ibarra (1996) sought to uncover some of the reasons why the presence of Latinos¹³ in graduate school or academia is not proportionate to their numbers in the general U.S. population. This qualitative ethnographic study involved 77 semistructured interviews with samples drawn from Latino faculty, administrators, and graduate students working on master's or doctoral degrees. The interviews elicited personal insights into the graduate school experience. Ibarra reported that Latinos were not a homogeneous group, but that there were differences among Mexican Americans, Puerto Ricans, Cuban Americans, and other Latinos relating to ethnic, socioeconomic, and educational backgrounds. He found, however, that those had less impact than the hidden ethnic conflicts between Latinos and the graduate education process. Latinos, like almost all graduate students, had problems adjusting to a new academic community and facing the rigors of graduate work. In this study, Ibarra found that the difficulties for Latinos in adjusting to graduate school were characterized by *academic cultural shock, ethnic renewal or recognition, and survival*.

Academic Culture Shock

Many respondents mentioned the difficulty of adjusting to an academic culture that was basically competitive rather than the cooperative culture to which they were accustomed.

Ethnic Renewal or Recognition

Ibarra reported that adjustments to graduate school in many cases differed by ethnic group. For instance, some had the experience of becoming aware of

¹³ Ibarra used the Spanish term "Latino" in the study, referring to "people representing a superset of nationalities originating from, or having a heritage related to, Latin America." He found that most participants in his study preferred "Latino" over "Hispanic" as a pan-national identifier.

torate recipients occurred since 1993.¹⁴ Degrees awarded to Asians were heavily concentrated in science and engineering. Eighty-five percent of the doctoral degrees awarded to Asians in 1995 were in these

¹⁴ For example, science and engineering degrees earned by Asians doubled in the 8 years between 1985 and 1993 but then jumped by an additional 127 percent in the 2 years between 1993 and 1995. A large part of this rapid rise was due to a change in citizenship status of Chinese students in the aftermath of the Tiananmen Square massacre in 1989. The Chinese Student Protection Act of 1992 made thousands of Chinese in the United States eligible to apply for permanent residency. The reclassification for this data tabulation of those doctorate recipients who received permanent residency status under this program increased the ranks of recipients who were labeled "U.S. citizens and permanent residents."

one's "minority status" for the first time. This experience was encountered more frequently by island Puerto Ricans, Cubans, and other Latinos. Others found that they experienced an "identity journey" in which the graduate experience was instrumental in defining their identity (Ibarra, 1996, pp. 38, 39).

Survival

Survival experiences, reported Ibarra, were coping strategies common to all underrepresented populations in higher education and were defined as defense mechanisms designed to surmount perceived cultural or academic deficiencies. For some Latinos, coping strategies ranged from aggression and overwork to withdrawal and self doubt. For still others, "survival issues included learning when to speak out and how to define their mission as cultural brokers within an alien environment" (Ibarra, 1996, p. 42).

Ibarra reported that these Latino adjustments to graduate school "occurred in various ways depending upon circumstances...[E]thnic-specific issues became masked by assumptions that most Latino behaviors are identical regardless of ethnic differences. Ethnic renewal and minority recognition, for example, had different implications for Mexican Americans...than for Puerto Ricans or Cubans. Differences relating to immigrant-like experiences were detected even between mainland and island Puerto Ricans. Yet rarely are such distinctions recognized, let alone incorporated into graduate programs" (Ibarra, 1996, p. 43).

Ibarra also reported that according to his respondents, "three factors were considered critical for completing a degree successfully: faculty mentorship, consistent financial support, and student support groups. Without these many respondents admitted they would not have attended or completed their degrees" (Ibarra, 1996, p. 64).

fields, up from 76 percent in 1985; this percentage increase was the largest in science and engineering participation exhibited by any racial/ethnic group. Asians were particularly heavily concentrated in engineering: they earned 17 percent of the total of all engineering doctorates and 31 percent of the engineering doctorates that were awarded to U.S. citizens and permanent residents. Twenty-four percent of all Asian doctoral degrees in 1995 were in engineering, by far the highest concentration in that field of any racial/ethnic group. An additional 51 percent of their total degrees were in the natural sciences.

The number of Hispanics receiving doctoral degrees in science and engineering increased by 92 percent over the 10-year period (from 296 in 1985 to 568 in 1995). Beginning in 1986, Hispanics became the underrepresented minority group receiving the highest number of science and engineering doctoral degrees awarded. Proportionate participation of Hispanics in science and engineering degrees increased as well: science and engineering degrees accounted for 47 percent of all Hispanic doctoral degrees in 1985 and increased to a majority of 54 percent of all degrees in 1995. Hispanics were the only underrepresented minority group to have over 50 percent of their doctoral degrees awarded in science and engineering fields. Approximately 7 percent of Hispanic doctorate recipients earned their degrees in engineering and 24 percent in the natural sciences. (See appendix table 4-39.)

The number of blacks receiving science and engineering doctoral degrees increased by 49 percent between 1985 and 1995 (from 374 to 557). Science and engineering degrees as a proportion of their total doctorates also increased but at the smallest rate of increase for underrepresented minorities: from 36 percent of degrees awarded in 1985 to 38 percent in 1995. The greatest concentration of blacks in science and engineering fields was in biology (13 percent of total degrees awarded to blacks) and in psychology (11 percent of total degrees). Five percent of black doctorate recipients earned their doctoral degrees in engineering, the smallest percentage for any racial/ethnic group. Most blacks (62 percent) earned their doctorates in non-science-and-engineering degrees; education was the most popular field, with 42 percent of black doctorates in that field alone. (See appendix table 4-39.)

American Indians increased their numbers of doctoral degrees in science and engineering by 68 percent over the 10-period, although the numbers were quite small in both years—41 in 1985 and 69 in 1995. Their percentage in science and engineering fields also increased, from 43 percent in 1985 to 47 percent in 1995. In 1995, 7 percent of American Indians earned their doctoral degrees in engineering. Almost 12 percent earned their doctorates in the social sciences and 10 percent in the biological sciences. Fifty-three percent earned their doctorates in non-science-and-engineering fields. Education was the most popular field for American Indians as well, with 27 percent of all their doctorates in that field. (See appendix table 4-39.)

The greatest number of science and engineering doctoral degrees continued to be awarded to whites (13,879, or 73 percent of the total science and engineering degrees to U.S. citizens and permanent residents). This number, however, represented an increase of only 14 percent since 1985, when whites received

12,169 science and engineering degrees. Whites were the only racial/ethnic group for which the *proportion* of total degrees awarded to science and engineering recipients was less in 1995 than in 1985, although the decrease was slight: from 57 percent of all doctoral degrees awarded to whites in 1985 to 56 percent in 1995. Although whites received 66 percent of the engineering degrees awarded to U.S. citizens and permanent residents in 1995, only 8 percent of their total degrees were received in engineering. (See appendix table 4-39.)

Doctorate Recipients by Sex and Racial/Ethnic Group

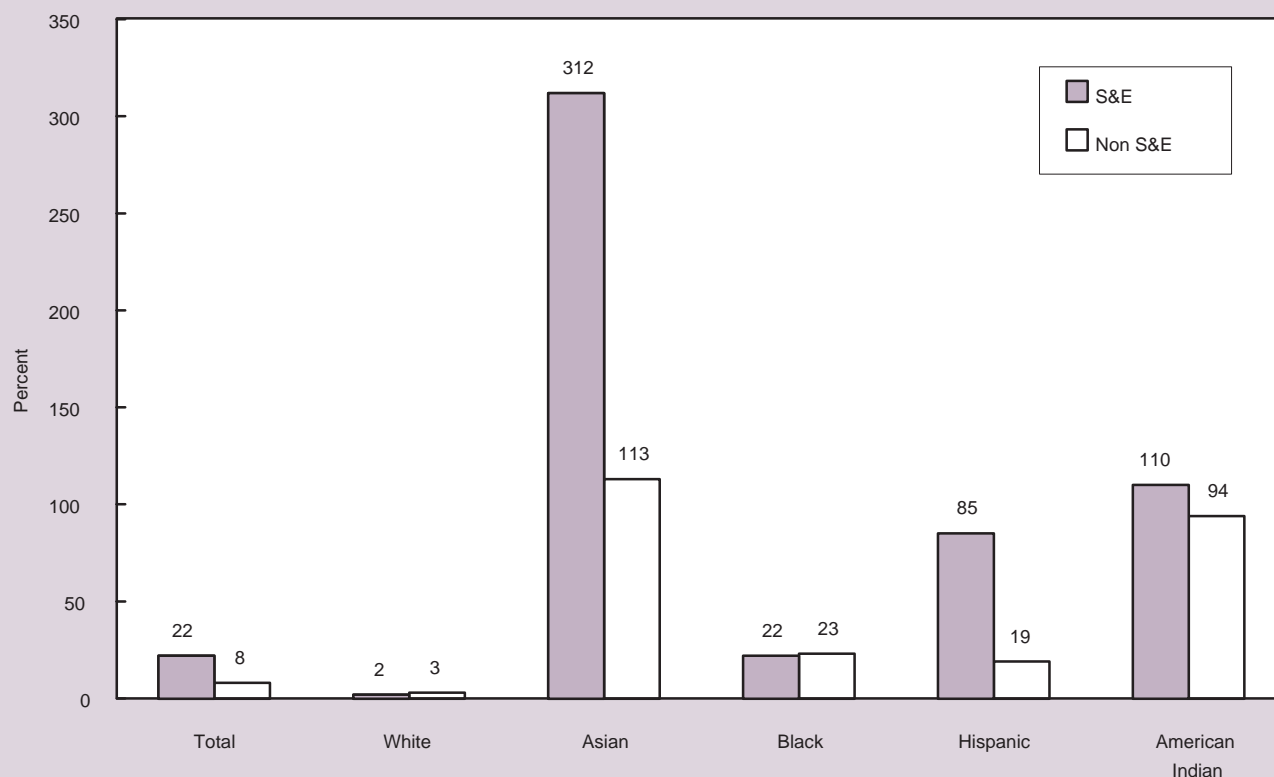
With one exception, since 1985 women from each racial/ethnic group outpaced the men from the same group in the rate of increase in doctorates awarded in both science and engineering fields and non-science-and-engineering fields. (See appendix tables 4-39 and 4-40.) The exception was the American Indians, in which women's percentage increase in doctorate degrees was much slower than the men's increase in all fields. For example, American Indian men doubled their number of total doctorate recipients over the 10-year period, from 40 to 81 degrees awarded. During the same time span, American Indian women increased their number of degrees by only 20 percent, from 56 doctorate degrees in 1985 to 67 degrees in 1997. (See figures 4-16 and 4-17.)

White women had a 7 percent increase in doctoral degrees overall, from 8,125 in 1985 to 11,123 in 1995. Their number of doctorates increased even faster (43 percent) in science and engineering, whereas their increase in non-science-and-engineering degrees was 32 percent. They tripled the number of engineering degrees they received over the 10-year time span, although the number of white women receiving an engineering doctorate was small in both years—106 in 1985 and 320 in 1995. Only 3 percent of white women earned their doctoral degrees in engineering in 1995. White women experienced a 38 percent increase in the number of science degrees awarded. On the other hand, white men were the only group—of both men and women of all racial/ethnic groups—to experience a decrease in the number of science degrees awarded. (See appendix table 4-40.)

Asian women received half the number of doctoral degrees in 1995 as Asian men (1,432 for women versus 2,868 for men), but the percentage growth in all fields was greater for women. Asian women increased their number of science degrees earned by 181 percent over the 10-year period and the number of engineering degrees by 700 percent. As for all women, the *number* of engineering degrees for Asian women

Figure 4-16.

Percentage increase in doctoral degrees awarded to male U.S. citizens and permanent residents, by racial/ethnic group: 1985–1995



See Appendix table 4-40.

Women, Minorities, and Persons With Disabilities in Science and Engineering: 1998

was also very small (168), but the *proportion* of Asian women receiving their degrees—15 percent of total degrees awarded to Asian females—was the highest for any women’s group.

Women received a minority of science and engineering doctoral degrees in every racial/ethnic group—although black women were awarded close to half, receiving 48 percent of total science and engineering degrees awarded to blacks. Hispanic women received 41 percent of total science and engineering degrees awarded to Hispanics. Asian women received the lowest proportion of total doctorate degrees—they were the only women in any racial/ethnic group to earn a minority of non-science-and-engineering degrees (33 percent of total) as well as a minority of science and engineering degrees (30 percent). Black women were awarded a larger percentage of engineering degrees than any other female racial/ethnic group (21 percent of all black engineering degrees).

Financial Support to U.S. Citizens and Permanent Residents for Funding of Doctoral Expenses

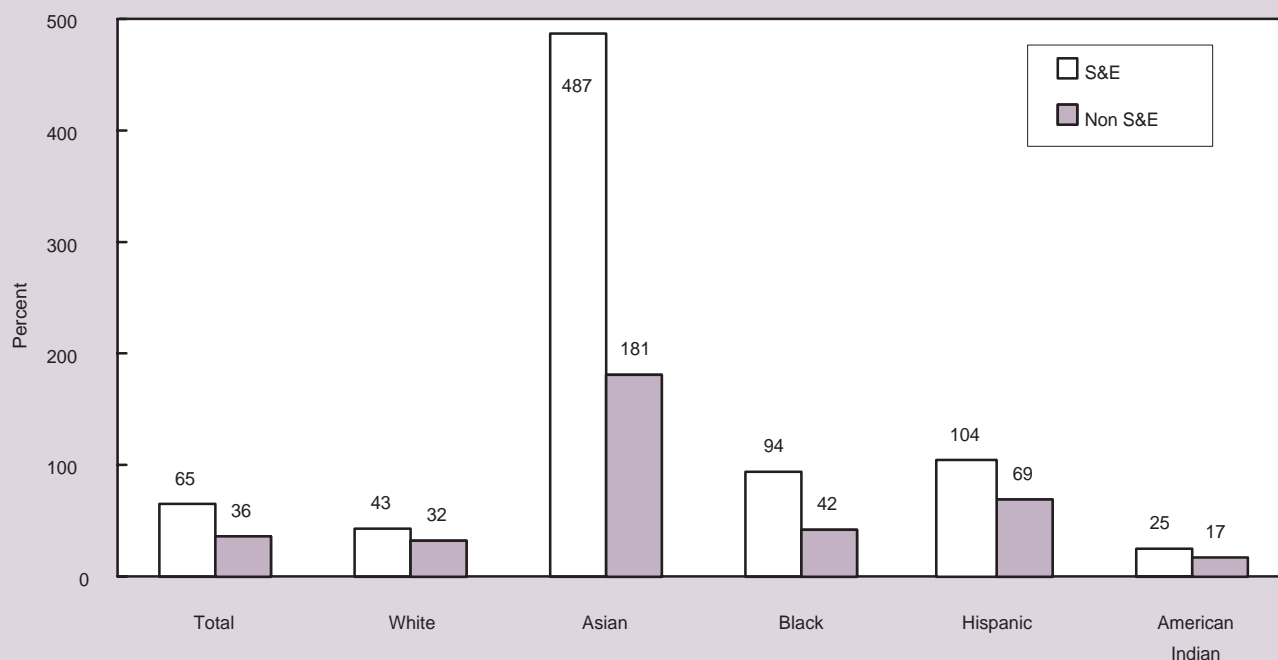
As reported by the Survey of Earned Doctorates, 53 percent of the U.S. citizens and permanent residents who received science and engineering doctoral degrees in 1995 supported themselves primarily through university-administered support mechanisms, such as research assistantships (29 percent), teaching assistantships (14 percent), and fellowships and traineeships (11 percent). (See appendix table 4-41.) Approximately 47 percent of the U.S. citizens and permanent residents were financed by the “other” sources—loans or self-, family-, or industry-support.¹⁵

In general the receipt of the four university-administered modes of support reported by U.S. citizens and

¹⁵ The tabulation of this “other” category also included those who did not answer the question.

Figure 4-17.

Percentage increase in doctoral degrees awarded to female U.S. citizens and permanent residents, by racial/ethnic group: 1985–1995



See Appendix table 4-40.

Women, Minorities, and Persons With Disabilities in Science and Engineering: 1998

Elapsed Time Between Bachelor's and Doctoral Degrees for Scientists and Engineers

There are many reasons why some doctorate recipients take longer to complete their degrees than others—some of the mitigating factors include family, cultural, or societal considerations; extent of financial support received while studying; and full-time or part-time enrollment by choice or necessity. The choice of degree is also very important, because this often dictates the availability of university-administered financial assistance available. (See the sections on financial support for women and for minorities.) In general, however, three observations can be made about the amount of time beyond the bachelor's degree that is required for recipients to earn doctoral degrees:¹⁶

1. Persons without disabilities generally earn their doctoral degrees faster than

persons with reported disabilities. In 1995, for instance, 82 percent of all doctorate recipients without reported disabilities had earned their degrees within 15 years of receiving the bachelor's degree. For persons with disabilities, only 72 percent had received their doctoral degrees within 15 years.

2. Men in general earn their doctorates faster than women. Of the total doctorate recipients in 1995, 83 percent of all men versus 79 percent of all women received the doctorate degree within 15 years of receipt of the bachelor's degree.

3. In general, Asians and whites earn their doctorates faster than the underrepresented minorities; among underrepresented minorities, blacks in general take longer to earn their doctorates than Hispanics or American Indians.

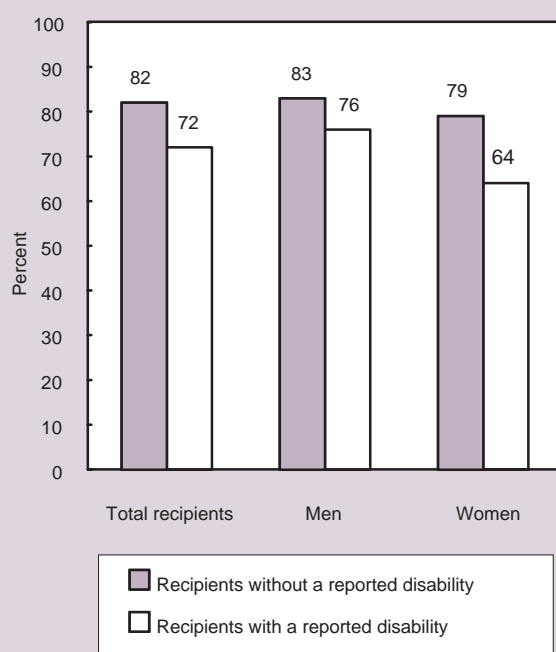
¹⁶ In this discussion, time-to-degree denotes elapsed time between the bachelor's and doctoral degrees; that is not necessarily the amount of registered time pursuing the degree.

Elapsed Time Between Bachelor's and Doctoral Degrees for Scientists and Engineers *(continued)*

Time-to-Degree for Women With Disabilities

The first two generalized observations combine for women with disabilities, so that women with disabilities take considerably longer to receive their degrees than either men with disabilities or women in general. (See figure 4-18.) Seventy-nine percent of all women without reported disabilities and 76 percent of men with disabilities received their doctoral degrees within 15 years of a baccalaureate degree; only 64 percent of women with disabilities received their doctoral degrees within that time span. In fact, almost one quarter (22 percent) of women with disabilities took longer than 21 years to receive their doctoral degree. In comparison, 12 percent of men with disabilities, 8 percent of women without reported disabilities, and only 4 percent of men without reported disabilities took that long to receive their doctoral degrees. (See appendix table 4-46.)

Figure 4-18.
Percentage of science and engineering doctorate recipients who received their doctoral degrees within 15 years of receipt of their bachelor's degree, by disability status and sex: 1995



See appendix table 4-46.

Women, Minorities, and Persons With Disabilities in Science and Engineering: 1998

Time-to-Degree for Racial/Ethnic Groups

The same restrictions of choice of degree hold for racial/ethnic groups as well; some fields of study offer far fewer opportunities for university-administered support to the degree candidate. For all degrees combined, 82 percent of all doctorate recipients received their degrees within 15 years of receiving the bachelor's degree. The data are very similar for both nonresident aliens (82 percent received the degree within 15 years) and U.S. citizens and permanent residents (81 percent).

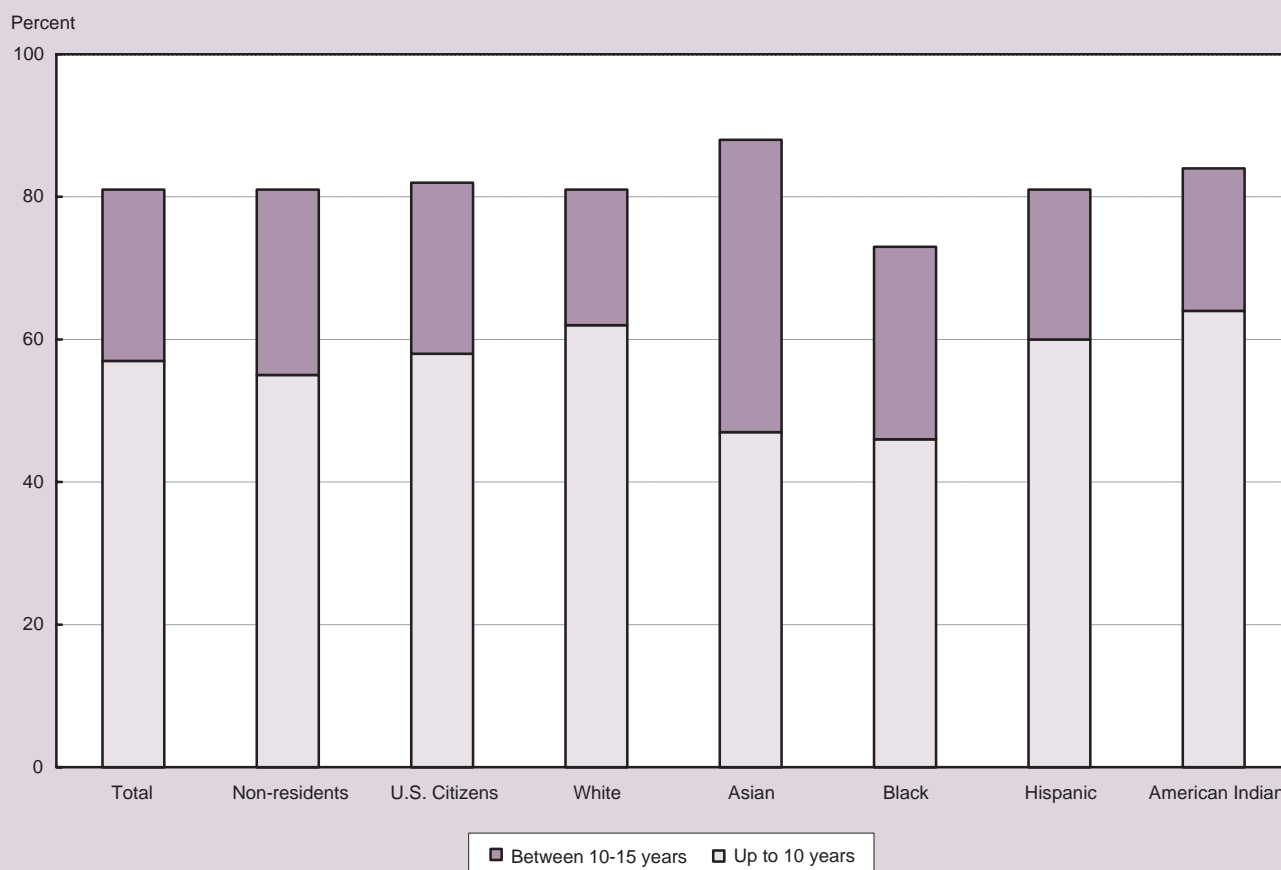
For the latter recipients, however, there are striking differences in the proportion of the different racial/ethnic groups who received the doctorate degree within the relatively short 10 years from the baccalaureate degree and those receiving their degrees during the next 5 years (for a total of 15 years from the baccalaureate). For those who receive their doctoral degrees within 10 years, the *proportion* taking the shortest time were American Indians (64 percent of total American Indian recipients had received their degrees by 10 years after the baccalaureate, although the total number of recipients is very small—42 recipients). Whites had the next highest proportion, 62 percent, and Hispanics were close behind with 60 percent of the recipients receiving the doctoral degree by 10 years after the baccalaureate. Asians (47 percent) and blacks (46 percent) had much smaller proportions of their recipients on this fast track in the early years.

The picture changes by 15 years after the baccalaureate, however. (See figure 4-19.) Forty-one percent of Asians received their doctorate in the next 5 years, so that Asians led the percentage of doctorate recipients (87 percent) who received their science and engineering doctorates within 15 years of the baccalaureate. All other racial/ethnic groups, except for blacks, had over 80 percent of their doctorate recipients receiving their degrees within 15 years of the baccalaureate degree—American Indians (84 percent, although the numbers remained small—just 58 recipients received their science and engineering degrees within 15 years of the baccalaureate); Hispanics (82 percent); and whites (81 percent). Only 73 percent of blacks had received their science and engineering degrees within 15 years of the baccalaureate, however. (See figure 4-19.) A larger proportion of black doctorate recipients (10 percent) and whites (9 percent) than other racial/ethnic groups took over 20 years from the baccalaureate to receive the doctoral degree. Only 3 percent of the Asian doctorate recipients took that long to receive their science and engineering doctoral degrees. (See appendix table 4-47.)

Elapsed Time Between Bachelor's and Doctoral Degrees for Scientists and Engineers *(continued)*

Figure 4-19.

Percentage of science and engineering doctorate recipients who received their doctoral degrees within 10 years and within 15 years of their bachelor's degree, by race/ethnicity: 1995



See appendix table 4-47.

Women, Minorities, and Persons With Disabilities in Science and Engineering: 1998

permanent residents reflected each group's proportion of the total numbers of doctorates awarded. For example, whites constituted 73 percent of doctoral degree recipients and received approximately 73 percent of the teaching assistantships and fellowships and traineeships. They constituted 68 percent of the research assistantships.

Asians received 19 percent of total doctoral degrees awarded to U.S. citizens and permanent residents in 1995. They received 28 percent of all research assistantships, 22 percent of all teaching assistantships, and 14 percent of the fellowships and traineeships.

The underrepresented minorities were more likely to receive traineeships and fellowships (many of which are minority-targeted) and less likely to receive research and

teaching assistantships. For example, blacks constituted about 3 percent of total doctoral degrees received by U.S. citizens and permanent residents but received 7 percent of the fellowships and traineeships. They received 1 percent of the research assistantships and 2 percent of the teaching assistantships.

Like blacks, Hispanics also constituted approximately 3 percent of the total doctorate recipients who were U.S. citizens and permanent residents. They received 5 percent of the fellowships and traineeships and 2 percent of both research assistantships and teaching assistantships.

American Indians constituted less than 0.5 percent of the total doctorate recipients who were U.S. citizens

and permanent residents. They received just over 0.5 percent of the traineeships and fellowships and less than 0.5 percent of all the other sources of support.

The broad field offering the largest proportion of research assistantships was the physical sciences; 45 percent of recipients of physical science doctorates received their primary means of support from research assistantships. Over one-third of the physical sciences doctorates of each racial/ethnic group, except for blacks, received research assistantships—34 percent of the Hispanics, 45 percent of the whites, 47 percent of the Asians, and 67 percent of the American Indians (again their numbers were small, with only six physical science recipients in 1995). Blacks had a much smaller percentage: only 9 percent of black physical science doctorates received their primary means of support from research assistantships. This group was the smallest in terms of numbers; only four blacks received research assistantships in the physical sciences.

The field offering the next largest proportion of research assistantships was engineering; 42 percent of all engineering doctorate recipients reported this mechanism as their primary means of support. Asians received a larger proportion of research assistantships in engineering than their proportion of the engineering population. They received 31 percent of all engineering doctorates to U.S. citizens and permanent residents in 1995 and held 38 percent of all the engineering research assistantships. (See appendix table 4-41.) Whites received 63 percent of the total engineering doctoral degrees awarded to U.S. citizens and permanent residents in 1995 and 59 percent of the research assistantships. Blacks and Hispanics each received about 2 percent of total engineering degrees and about 1 percent of the research assistantships in engineering.

As a proportion of each racial/ethnic group, a larger proportion of Asians than other racial/ethnic groups received research assistantships in engineering. Fifty-two percent of Asian engineering doctorate recipients received their primary means of support by this method. In contrast, 40 percent of the white engineering recipients, 30 percent of the American Indian (but a small number—three total), 22 percent of Hispanics, and 17 percent of black engineering doctorates listed research assistantships as their primary means of support.

Doctoral Degrees Received by Persons With Disabilities¹⁷

The number of persons with reported disabilities who received science and engineering doctoral degrees in 1995 was very small, but the total has been increas-

ing rapidly: the 355 recipients in 1995 were a 78 percent increase from the 200 science and engineering recipients in 1989. Persons reporting disabilities constituted 1.3 percent of all doctorate recipients in 1995, up from 0.9 percent of the total in 1989. (See appendix table 4-42.)

In science and engineering fields, the concentration pattern for persons with disabilities was different from the concentration pattern for persons with no reported disability. Forty percent of all science and engineering doctorates received by persons with disabilities were in the social sciences and psychology (20 percent in each field.) This segment was much larger than the 28 percent of science and engineering doctorates in these two fields received by persons with no reported disability (15 percent of all recipients received their doctorates in social sciences, and 13 percent received their doctorates in psychology). (See appendix table 4-43.) Persons with disabilities made up approximately 2 percent of the total number of doctorates in each of these two fields.

Only 18 percent of persons with disabilities received their doctoral degree in engineering versus 23 percent of the doctorate recipients without disabilities. However, since 1989 the percentage of degrees awarded to persons with disabilities has risen faster in engineering than in any other field. There was an increase of 152 percent in the number of engineering degrees awarded to persons with disabilities, from 25 in 1989 to 63 in 1995 (see appendix table 4-42); during the same time span, the number of engineering doctorate recipients overall rose only 32 percent. The total number of persons with disabilities who were awarded doctoral degrees in science also increased faster than the total number of degrees: the number of science recipients with reported disabilities increased 67 percent (from 175 in 1989 to 292 in 1995), whereas the overall increase in science degrees between 1989 and 1995 was 19 percent.

Types of Disabilities

Overall, 27 percent of doctorate recipients with disabilities reported a visual disability, and 27 percent reported that they had a disability in mobility. Engineering recipients with disabilities were more likely to have visual impairments (37 percent) than recipients of science doctorates (25 percent). Mobility disabilities were the most common reported by science doctorate recipients (28 percent). The proportion was little changed from 1989. (Appendix table 4-44 depicts the types of disabilities reported by the doctoral recipients in 1989 and 1995.)

The number of doctorate recipients with disabilities who had vocal problems was only 1 percent overall and very small in both sexes. Fewer of the female recipients with disabilities (9 percent) reported auditory problems than the males (15 percent). (See appendix table 4-45.)

¹⁷ There are no comparable data collected for master's degree recipients.

Women With Disabilities

Women overall received 31 percent of the total science and engineering doctorates, but they received 34 percent of the science and engineering degrees awarded to persons with disabilities. Women with disabilities generally took longer to receive their doctoral degrees than did either men with disabilities or all doctorate recipients. (See “Elapsed Time Between Bachelor’s and Doctoral Degrees for Scientists and Engineers.”)

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